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SEPTEMBER, 1920

CONTENTS

ORIGINAL ARTICLES

(Continued on Advertising Page III.)

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MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association

VOL. III SEPTEMBER, 1920 No. 9

DIAGNOSIS IN INJURY OF THE PERIPHERAL NERVES*

By ARTHUR S. HAMILTON, M. D.
Minneapolis, Minn.

Aside from the functional neuroses, no condition with which the neurologist has had to deal has appeared so frequently in the late war as injuries of the peripheral nerves and this very large number of cases has offered not only an unprecedented opportunity for the study of the symptoms but also a great problem in respect to their care.

The restoration of an injured nerve to normal offers certain difficulties and peculiarities which distinguish the problem from that found in any other kind of plastic surgery. There is nothing in the physiological equipment of the individual comparable, for example, with compensatory circulation of the blood, on which the patient can fall back in case of interruption of a nerve. Moreover, the restoration to normal of continuity in a nerve, though an absolute essential to cure, is no guarantee that the nerve will function, in which again the condition is altogether dissimilar from that seen in such a condition as fractured bone. The approximation of the ends of the severed nerve and their subsequent healing results merely in the restoration of the frame work and, if function is to follow, the nerve fibers must find their way down the old nerve sheath and effect an approximation with their essential end organs and this through tissues to which the nerves are alien. It is important to remember that the nerves have their origin in parts far away from those in which they ultimately come to lie and carry on their activity and though this penetration of foreign tissue may occur readily in intrauterine life, it is probably a very difficult problem in adult life. Finally, the destruction of a part of the shaft of a bone or of a portion of the vessels of some one part of the body, even though no improvement may subsequently occur, is not necessarily disabling, whereas, an injury, with partial destruction of a nerve, may result in a condition so painful as to be even much worse than if the nerve were totally severed.

Eighteen to twenty per cent of all injuries to limbs in war time is accompanied by peripheral nerve wounds, and among these certain nerves are involved much oftener than others. The musculo-spiral nerve is most often injured, quite fifty per cent oftener than any other, due to its intimate relation with the humerus, which is often fractured with secondary involvement of the nerve. The ulnar nerve is next most often involved, with the median and sciatic closely following. The external and internal popliteal, the circumflex, and the brachial plexus are not infrequently injured. It is very common also to find a combination of nerve injuries, though usually some one nerve is more seriously involved than the others.

The different lesions which may be found in the individual nerves are: 1. Interruption,

Fig. I. Atrophy of the interossei in ulnar nerve lesion.

*Read before the Minnesota State Medical Association, October, 1919, Minneapolis, Minn.

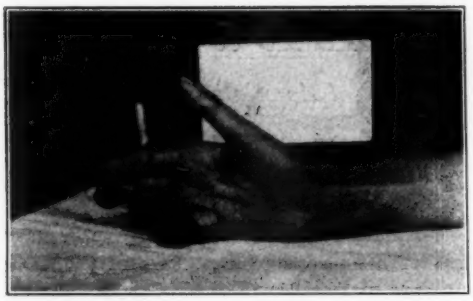

Fig. 2. Palmar view of same case. Note the atrophy of the hypothenar eminence and the flexion of the second phalanx (superficial flexor) of the fourth and fifth fingers.

Fig. 4. Musculo-spiral paralysis with wound below the point of innervation of the supinator longus and preservation of power of contraction of that muscle.

partial or complete; 2. Compression; 3. Irritation. Finally we have a syndrome of regeneration.

Ordinarily the first symptom following a serious injury to a nerve is a complete loss of motion and sensation in the entire limb below the seat of injury; quite comparable to a hysterical, or glove or stocking anaesthesia. This lasts for a variable period of a few hours to two or three days and the patient then becomes aware of a certain more or less clearly defined loss of motion and sensation, and the syndrome is established.

The important points to be determineded in the clinical examination of any nerve injury are: Is there a nerve injury and if so of what nerve or nerves? What is the nature of the injury; interruption, compression, or irritation? Is regeneration occurring? What shall the treatment be, especially the surgical treatment?

To determine the presence of an injury and the nerve involved implies a certain knowledge of the anatomy and physiology of the nerves and muscles of the affected part, the more complete the knowledge the more easy and satisfactory the diagnosis. The examination should be complete and methodical. Otherwise, serious nerve complications may be overlooked in the presence of other injuries.

It will be impossible in the time at my disposal to enter into all the clinical symptoms and signs of nerve involvement and I shall confine myself therefore to the more important, namely: disturbances of motion and of sensation, vasomotor and trophic disturbances and disturbances of the reflexes and of the electric responses and the objective examination of the nerve:

Loss of power of motion is one of the most characteristic signs of a nerve lesion and varies

Fig. 3. Musculo-spiral paralysis with loss of power of extension of hand and fingers and loss of contraction of the supinator longus. Note the wound above the elbow.

Fig. 5. Musculo-spiral paralysis with dorsal swelling of the carpus due to teno-synovitis of trophic origin.

Fig. 6. Atrophy of the thenar eminence in median paralysis.

from partial loss to complete paralysis. Certain precautions must be taken in making a motor test. Thus, we must make sure that the loss of movement is not due to the contraction of antagonistic muscles and we must be very sure that compensatory movements are not obscuring a real paralysis. Also, if a movement is to take place in any unfavorable direction, so that the muscle must move the limb against the influence of gravity, a mere weakening of a muscle may easily be mistaken for a complete paralysis. Thus, a weak biceps may flex the forearm on the arm when the arm is held in a horizontal position but be quite unable to effect any movement if it must raise the forearm against the influence of gravity. In the same way if the extensors of the hand on the wrist are weak, their action may be shown only where the hand is held half way between pronation and supination. In other words, in determining the presence of very slight motor power, we must employ zero positions by which is meant that attitude for each muscular group in which the feeblest movements may be detected.

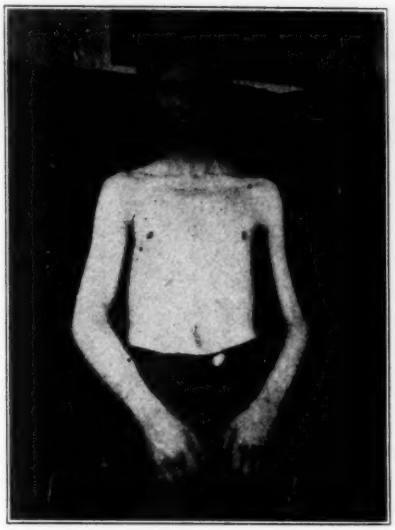

Fig. 8. Injury of the left brachial plexus with total radicular paralysis.

Inability to perform a movement due to contraction of antagonist muscles or to a stiff joint is easily ascertained by attempting passive movements.

Substitution or compensatory movements are very commonly seen in peripheral nerve injuries. Thus, adduction of the fingers is accomplished by the palmar interossei and abduction by the dorsal interossei, both of which groups of muscles

Fig. 7. Causalgia in median nerve injury.

Fig. 9. Ischaemic paralysis following the application of a too-tight cast, with sloughing of the soft tissues of the forearm.

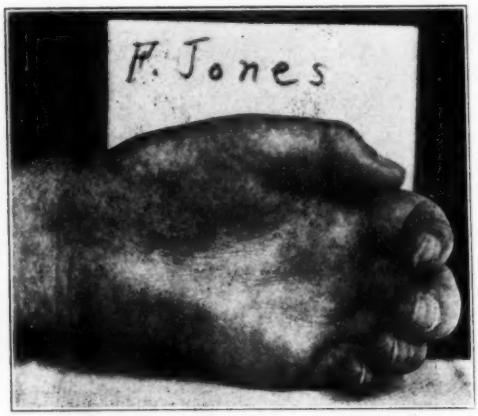

Fig. 10. Ischaemic paralysis following injury to arteries supplying the arm.

are supplied by the ulnar nerve, yet in complete ulnar paralysis both movements may be preserved to a considerable degree, for the extensors of the fingers may serve as abductors and the flexors as adductors in an emergency. In fact, the only movement, ordinarily performed through the ulnar nerve, which cannot possibly be simulated is adduction of the little finger. Only careful observation and interpretation of movements permits one to detect these substitution phenomena.

Finally, there may be no movement because of lack of effort on the part of the patient due

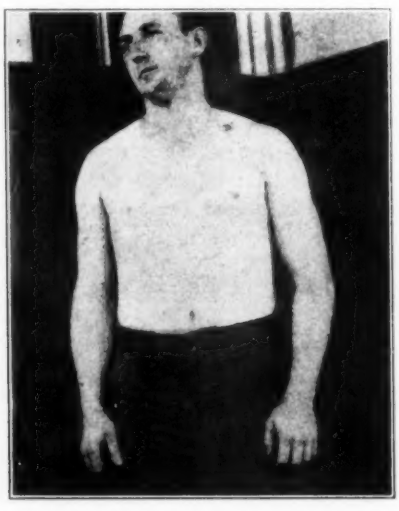

Fig. 11. Hysterical motor and sensory paralysis of the left arm due to an injury above the level of the left brachial plexus. (See Fig. 22.)

Fig. 12. Paralysis of the right external and internal popliteal.

to conviction of inability to accomplish the act, to malingering or to hysteria. If in any case of apparent attempted movement on the part of the patient there is not a synergic contraction of neighboring and antagonistic muscles one may suspect an artificial incapacity and in such a case a faradic current should always be tried. In genuine paralysis, not of cerebral origin, the faradic response is always lost save in a very few cases of slight compression as for example in some instances of crutch paralysis.

Following a nerve injury there is usually a definite area of sensory loss, marked in ulnar, median, sciatic, and external and internal popliteal, and relatively slight in musculo-spiral injuries. There are several different kinds of sensory loss, and one cannot enter into a discussion of all, but it is at least necessary to distinguish clearly between superficial or cutaneous and deep sensibility. The outlines one sees ordinarily on the skin, represent superficial, not deep, sensibility, and are made by cotton or camels' hair touch and by pin prick and instruments for determining temperature. Deep sensibility is supplied by other nerves and is determined by testing the sensibility to pressure, the sense of attitude and the presence of bone sensibility, and is much less useful in diagnosis of nerve injuries than is superficial sensibility.

Usually a patient tests his own sensibility by

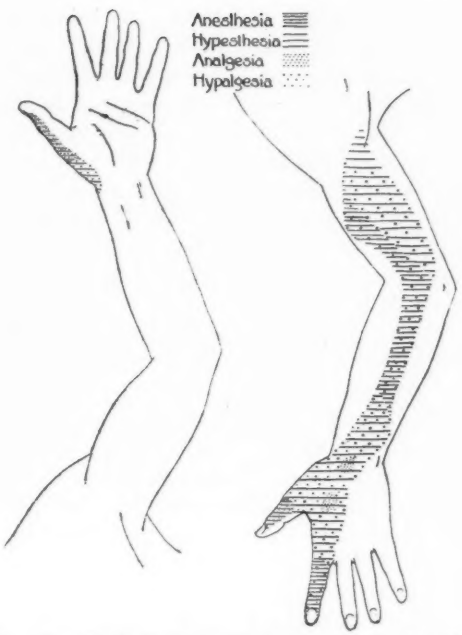

Fig. 13. Typical area of sensory loss in high musclo-spiral paralysis.

pressing or rubbing the part with his fingers, which naturally tests deep sensibility, and if he gets a sensation he is likely to assume that there is no loss of feeling, even when superficial sensibility is greatly or wholly impaired.

For careful examination it is necessary to shave the part and to test with either cotton or camel's hair brush, with pin prick, with pressure and with joint movements, and with instruments for determining temperature and vibration sensibility. For ordinary clinical purposes a pin point will usually suffice and by means of it we may detect fairly accurately touch, pain and pressure. For rough clinical purposes one may also use stroking touch which is said by Trotter and Davis* to give the widest outline and most delicate response.

Besides loss or diminution of sensibility, one must look for increased sensibility to cotton, prick, or other test, and patients will often speak of the pin as giving a more or less numb feeling and yet "hurting more"; in other words, a painful hypoaesthesia, the most frequent form of paraesthsia found in nerve irritation. Involuntarily the part is jerked away when the pin is applied to such an area. This condition, known as causalgia, occurs especially in injuries of the median nerve and was, in three of our cases, the source of the most excruiating pain.

Vasomotor changes occur in practically all nerve injuries whereas trophic changes are much more common in nerve irritations than in interruption or compression. Cyanosis and redness in the affected area of the extremities is almost constant. Oedema is also frequently seen and hypertrichosis occurs. In interruption or compression of nerves, a transverse grove usually appears in the nail marking the time at which the injury occurred but in nerve irritations much more striking changes may occur in the nails. A dry skin, rarely with a branny desquamation, occurs in most nerve sections but in nerve irritations there is often excessive sweating. It is said that in a severed nerve, with subsequent healing, the loss of sweating is the last abnormality to disappear in the affected area. The skin is also often smooth or even glossy and shows a notable loss of the cutaneous folds and papillary crests, which change again is much more marked in nerve irritations than in nerve sections. The skin has a peculiar fibrous feeling and may be adherent to the underlying tissue, to which this trophic change may extend, so that there is a

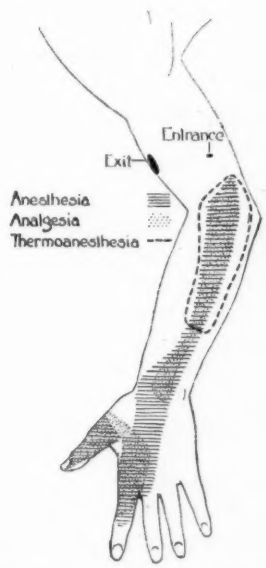

Fig. 14. Sensory loss in musculo-spiral paralysis from wound midway in upper arm.

*Brain: Vol. XXXVIII, Nos. 2 and 3, p. 134-247. Feb. 9, 1909.

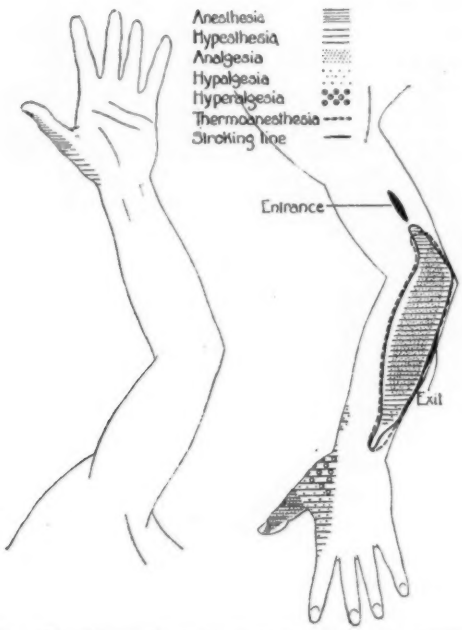

Fig. 15. Unusual area of sensory loss in musculospiral paralysis from wound midway in upper arm.

thickening and contraction of the tendon sheaths and of the fascia, producing peculiar claw like appearances in the hands and deformities in the feet. Osseous decalcification is not uncommon.

Muscular atrophy occurs in injury of all nerves containing motor fibers. It appears after two or three weeks, develops rather slowly, is worse in irritation than in section of the nerves and persists long after motion has reappeared. In complete section of the nerve there is marked loss of tone in the muscles and a loss of pain sensibility on deep pressure. In nerve irritation, on the contrary, there is often hypertonus of the muscles and marked increase of pain on pressure.

Tapping over a normal muscle fasciculus produces a local and momentary swelling of the part, with a resulting movement. This is known as the idiomuscular reflex and is usually increased in peripheral nerve lesions, even though complete. It gradually fades out as the muscle atrophies.

The tendon or deep reflexes are always lost in true paralysis of peripheral nerve origin and retention of the reflex is evidence of either a central or a psychic paralysis.

Electrical testing is an important part of the examination of any peripheral nerve injury. The presence of a faradic response readily distinguishes such cases as hysteria and malingering but all forms of electric tests, when used in large groups of soldiers, have not sufficed to make a positive diagnosis as between the cases of complete loss of function, with compression only, of the nerve and loss of function with loss of continuity, the most frequently recurring, difficult diagnosis to be made in a group of peripheral nerve injuries.

Pressure on a severed nerve trunk, below the seat of section or compression, produces no sensation but pressure on an irritated nerve trunk is painful throughout the entire course of the nerve below the lesion. This pain on pressure must be differentiated from formication on tapping over the severed nerve trunk, known as Tinel's sign or D. T. P. (distal tingling on percussion), an evidence of axis cylinder regeneration. If a nerve trunk is tapped just below the seat of injury and shortly after the nerve is severed, no sensation is induced but if healing of the nerve occurs and the tapping is renewed about four to six weeks after the injury, a

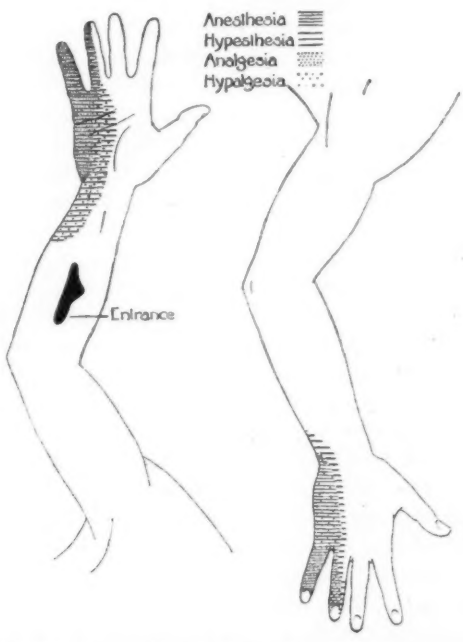

Fig. 16. Loss of sensation in hand and lower part of forearm due to injury to ulnar nerve in middle of forearm.

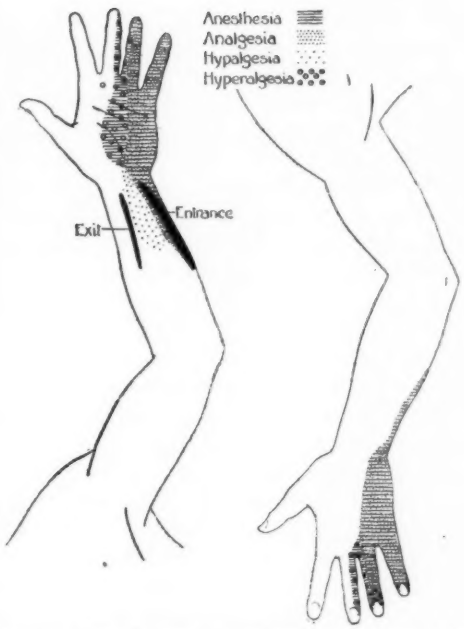

Fig. 17. Wider area of sensory loss from injury to ulnar nerve at the wrist.

peculiar tingling is felt, described by the patient as like electricity, not at the point of tapping but at the peripheral distribution of the nerve. This is Tinel's sign and is by him, in his most excellent book, regarded as of supreme importance, indicating the downward growth of new axis cylinders. As these, under ordinary conditions of healing, grow down the limb at the rate of one to one and a half m. m. per day, the production of this phenomenon at succesively lower levels was interpreted by Tinel as proof of a satisfactorily healing nerve. The tapping should be done gently and from below upward and a record kept of the point at which it appears on successive examinations. Unfortunately the sign has not, in practice, been found to possess the value first claimed for it. Either its significance has been wholly misinterpreted or else it is possible for a very few axis cylinders, growing downward, to induce it, quite insufficient in numbers to result in any return of function to the affected part. At least in my experience it has frequently been possible to demonstrate the steady downward growth of the phenomenon in cases when there was no return of function to the part involved even after many months of watchful waiting.

In connection with the direct examination of the nerve one should look for a neuroma, a more or less bulky thickening of a nerve, at its point of injury, made up of twisted and rolled up axis cylinders. When a nerve is severed the two ends tend to coaptate and the central end tends to grow into the peripheral, attracted by the neurotropism of the latter. If there be an obstacle as a dense scar, then the axis cylinders above can only roll up into a ball constituting a true neuroma.

On the peripheral end of the severed nerve another swelling occurs but this is merely a mass of neuroglial cells, contains no axis cylinders and is known as a glioma or false neuroma. A nerve, merely contused, is likely to produce a swelling in the course of its trunk which in this instance is a false neuroma.

The finding of a neuroma, therefore, locates the lesion but does not tell if there is complete separation. If a distal swelling can also be palpated we are certain of a separation, either partial or complete. In either case the presence of the neuroma or neuromata does not tell us whether regeneration is occurring.

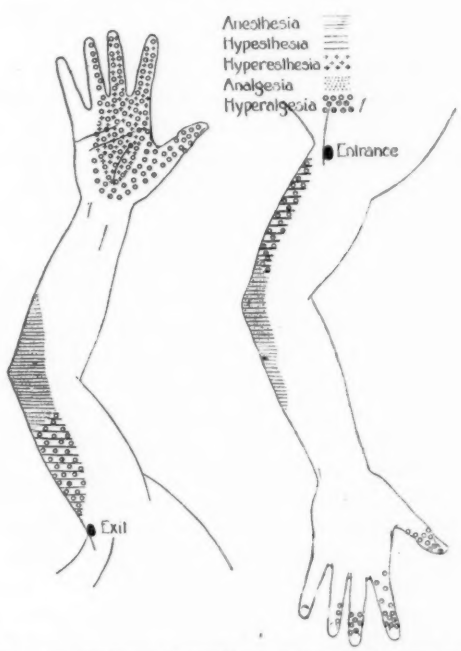

Fig. 18. Sensory disturbance (causalgia) from gunshot wound in the region of the axilla involving the median and internal and lesser internal cutaneous nerves.

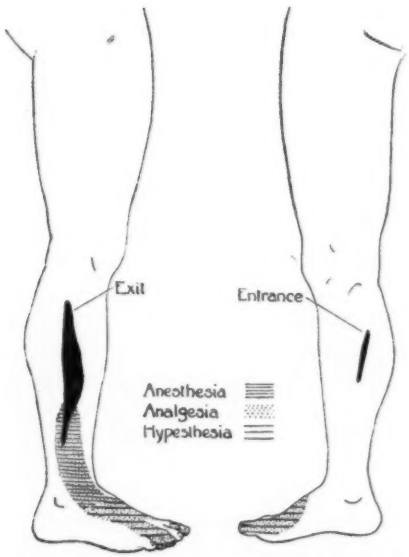

Fig. 19. Sensory loss in injury of the peroneal cutaneous and musculo-cutaneous nerves. Anterior tibial not involved.

If these statements are correct, it is apparent that though the diagnosis of the presence of a nerve injury is not a particularly difficult matter, the character of that injury, especially as regards the difference between physiologic and anatomic discontinuity, is often a very difficult matter. The return of voluntary movement, assuming that we have carefully excluded substitution movements, is the most reliable sign of a healing nerve and almost the only single sign that can be absolutely relied upon, yet a careful and complete examination and an intelligent consideration of all the phenomena that can be brought out suffices to make an accurate diagnosis in most of the cases. There remains a certain small number, however, in which the spread of a Tinel sign or the gradual disappearance of the sensory loss or the presence of other signs leads one to believe that healing is occurring yet no return of motion occurs and in the end one is forced to operate and the operation may show a completely severed nerve with no microscopic evidence of any tendency to heal.

Remembering that the healing of a nerve is a slow process and that even after the axis cylinders have grown down to their ultimate termination, time must be given them to effect a proper connection with their appropriate end organs before function can be restored, it is obvious that one cannot speak with any certainty as to prognosis in severe cases except those that have been long under observation. To one who sees these patients for the first time and remembering the rather conservative views that have been generally held as to the results of peripheral nerve surgery, they appear a rather hopeless lot. It is decidedly encouraging then to see the relatively large number who, with signs of a complete physiologic block but of course without loss of anatomical continuity, after a few weeks or a few months begin to show signs of satisfactory improvement and ultimately fully recover. Certainly well over half of the patients that came under my observation recovered or were apparently satisfactorily recovering at the last time I saw them. Tinel gives the percentage of spontaneous recoveries as between sixty and seventy. Of the operated cases, the most satisfactory are those where only liberation of the nerve from scar tissue is needed and in them the recovery is at times surprisingly rapid. Of the cases that were operated for complete nerve section, very few were under my observation sufficiently long to determine the

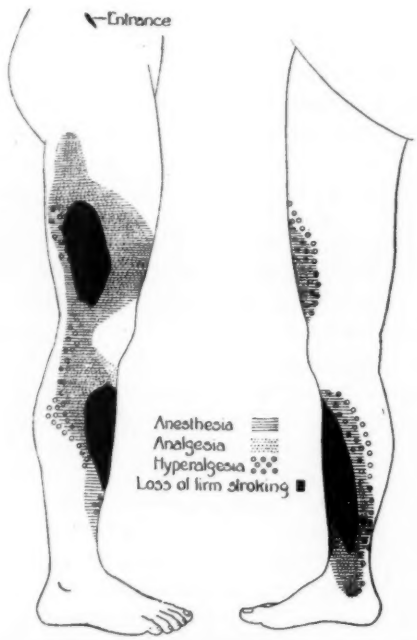

Fig. 20. Peculiar sensory disturbance in injury of the anterior crural nerve.

Fig. 21. Hysterical loss of sensibility in the arm and hand following fright in battle.

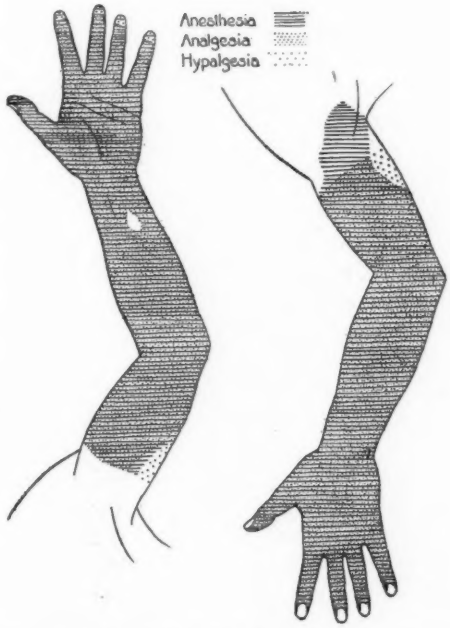

Fig. 22. Hysterical loss of motion and sensation in the hand and arm following injury above the brachial plexus. (See Fig. 6.)

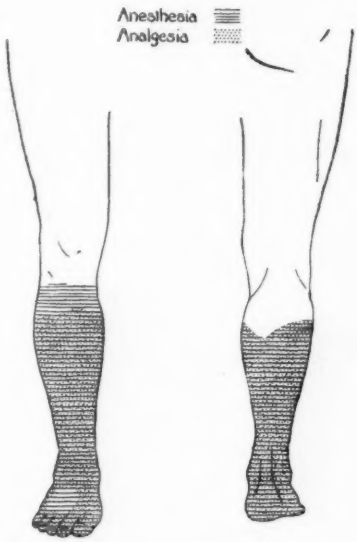

Fig. 23. Hysterical loss of sensation in the feet and legs.
Note the peculiar areas of sensory loss in hysterical cases.

result. Yet in a few older cases, there had been a very definite improvemnt, both motor and sensory, at the last time I saw them and one had every reason to expect their ultimate cure and, if this restoration can occur in some cases, there seems no reason to doubt it will occur in others, assuming of course that the individual is otherwise healthy and that the ends of the nerve can be brought together in the midst of healthy tissue and without undue tension.

I saw no case of nerve transplantation which showed positive signs of healing but it must be added that none of these observed by me had been operated sufficiently long to permit of such evidence and some of them did show sensory improvement and the presence of a Tinel sign.

PERIPHERAL NERVE INJURIES*

By J. F. Corbett, M. D., F. A. C. S.
Minneapolis, Minn.

The late war has given abundant opportunity to study peripheral nerve injuries. The experience has taught that in one hundred cases of palsy from war wounds about sixty or eighty cases recovered without operation if given proper mechanical, postural and electrical treatment. In the remaining twenty to forty, operative procedure was necessary. The cases due to recover spontaneously can not often be determined until a considerable period of time has elapsed. Both may exhibit flaccid paralysis, loss of sensation, reaction of degeneration, absence of reflexes and atrophy. Careful neurological examinations, often repeated, will determine whether these conditions are stationary. When they are stationary for three months after healing is completed, operation is indicated. The Tinel sign is of doubtful value when the exact type of lesions is unknown. One may get the Tinel sign in nerves that are almost completely divided, provided a few fibres have escaped destruction. After operation the Tinel sign usually is of value, especially if positive. On the other hand, a negative Tinel does not furnish sufficient indication for a second exploration. Early exploration done by the German military surgeons in the first part of the war has furnished a foundation for a statement concerning the underlying pathology of the lesions due to undergo spontaneous recovery, the so-called physiological interruption.

Tubby has applied the term "concussion of the nerve" to a form of physiological interruption. "It is damage done to a nerve-trunk without actual destruction of axis cylinders, and the damage may consist of an effusion of blood between the fibers following compression of a nerve against bone by the rapid passage of a foreign body in the immediate neighborhood of the nerve. In other cases actual lesion may not amount to hemorrhage but to a temporary anemia, or its opposite, hyperemia."

Heile and Hezel state if the nerve be grazed by a bullet, that an inflammatory exudate may occur in the nerve, causing the contour of the nerve to be altered. The diameter of the swollen nerve may be three times that of the normal nerve. In time this exudate is absorbed, leaving behind more or less intraneural scar tissue and adhesions to nerve sheath. The amount of connective tissue determines whether the interruption is physiological or anatomical.

Those cases where no spontaneous recovery could occur are due to either one of two causes, —first, complete interruption of the nerve trunk; and second, a binding down of nerve tissue either by scar tissue, bony callus, or some foreign body. Frequently, such conditions occur in the neighborhood of fractures. Liberation of extra-neural scar tissue is followed by almost immediate recovery. In this connection there is one type of lesion that I wish to caution against. On two occasions I have found the sciatic nerve to be bound down by a heavy sheet of extraneural scar tissue. The temptation was very strong to simply remove the band of scar tissue and stop at that point. However, in both these cases, inside the nerves were discovered masses of scar tissue whose presence had been concealed by a thin zone of normal tissue. These intraneural keloids are very deceptive, and any nerve that does not respond to stimulation by the Bristoe coil should be carefully explored at the time. The appearance of the external wound often is deceptive. Extensive scar tissue over the course of a nerve does not always preclude the possibility of spontaneous regeneration.

One hundred and two days after healing was the average time for beginning return of voluntary motion in paralysis of the musculospiral. In two cases the voluntary motion began to manifest itself at the end of one hundred and fifty days after complete healing. In one of these the wound had healed in fifteen days. Some of these cases were delayed in recurrence of voluntary motion from the fact that the disability was caused more from overstretching of the paralyzed muscles than from the nerve lesion itself. It was a common thing to get return of voluntary motion soon after proper postural treatment had been carried out when that factor had been neglected. Splint-

*Read before the Minnesota State Medical Meeting, Oct. 1-3, 1919, Minneapolis, Minn.

ing, massage, properly directed passive movements and electricity are of fundamental importance. Of the splints I wish to mention our own plaster-molded cock-up splint for the musculospiral and the napkin ring splint for ulnar paralysis. In addition, a right angle external stop splint for foot drop and the arm abduction splint were commonly used. In place of stock splints our best results were obtained when the appliances were made to fit each individual case. The plaster molded cock-up splint was so made as to relax the extensor tendons of the wrist, thumb and fingers; to preserve the arch of the hand; and to allow of all normal muscle action. These were molded to fit the hand placed in the proper position, and after setting were removed, baked and varnished, so as to render them waterproof. The ulnar splint was made of aluminum and consisted of a plate so bent as to fit the outside of the hand. Full flexion of the fingers was possible, but hyperextension or stretching of the interossei was prevented. All splints were removed daily, and massage, electricity and passive movements were employed. These must be intelligently directed so as to avoid stretching of paralyzed muscles. The masseuse should have a knowledge of the anatomy of the parts treated, or else be furnished with iron-clad instructions for each type of paralysis. Hot water and radiant heat proved themselves of great value. However, the skin in these palsied extremities is very easily burned.

Anatomical interruptions described by various authors may range anywhere from severance of a nerve with separation of its ends to complete fusion of nerve ends in gigantic masses of scar tissue. Every cut nerve when allowed to heal, whether completely severed or not, presents an enlarged bulb at the site of injury springing from the proximal segment. This is known as a neuroma. The neuroma consists of the local proliferation and entanglement of regenerated nerve fibers. It represents an attempt of the axis cylinders to penetrate the connective tissue simultaneously forming. Some of the fibers are strangled, others are deflected and may form Perroncito spirals. Tinel considers tumors formed by thickening of the envelopes, by hemorrhagic or fibrous infiltration of the nerve, or by neurological elements to be pseudoneuromata.

When a nerve is anatomically interrupted, certain changes take place in the nerve proceeding from the lesion peripherally so far as the nerve distributes. These changes, first described by Waller in 1850 and amplified by Ranvier in 1873, by Beneke in 1872, and by Huber and Howell in 1892, and finally by Ransom in 1912, are commonly referred to as wallerian degeneration. This consists of at least three distinct processes; first, change and fragmentation of axis cylinders; second, myelin change and absorption; third, changes in the syncytial cells of Schwann. The last process is emphasized in studies on regeneration. Soon after section of a nerve the cells beneath the neurilemma begin to hypertrophy, sending out processes of protoplasm. Numerous nuclei resulting from mitosis soon appear in these bands. These protoplasmic, many nucleated masses, are known as protoplasmic bands. Attention was called to them by Bunger in 1891. Howell and Huber described embryonic bands or embryonic nerve fibers in 1892. Lewis considers these protoplasmic bands to be essential to nerve regeneration in that they form a conducting pathway. Ingebrigtsen has shown the possibility of axis cylinder growth in plasma, and Clark has found regeneration of nerves in beriberi without change in the neurilemma. Axis cylinders, according to Huber, have some power of penetrating scar tissue. Spontaneous repair of severed nerves has been recorded where a considerable gap had to be bridged. Notta's case is an example. Notwithstanding the above exceptions, the new conduits formed by protoplasmic bands offer the best channel regeneration. Korybutt-Daskiewicz considered the proliferated sheaths of Schwann as anlage for new axis cylinders.

In complete section of a nerve there is not only intraneural formation of scar tissue reaching to a considerable extent into the nerve, but there is usually actual separation of the ends due to either destruction of nerve substance or retraction of the nerve. Usually there is extensive scar tissue all about the nerve. This has been attributed to infection, but great amounts of scar tissue are found in nerve

avulsions where there has been no external wound. In the latter case the presence of scar tissue can best be explained as a result of hemorrhage. Oftentimes, at the site of a gunshot wound there is no normal anatomy left. Dujarier described three zones in nerve wounds: (a) neurofibrome; (b) zone adherente; (c) zone libre. The neurofibromata may be of considerable size, while the zone adherente may be a mass of indistinquishable scar ten or fifteen centimetres in length. Such damaged nerves can only be found by starting dissection in normal structures in either side of the scar tissue area.

Not only are dissections difficult, but the nerve may actually be carried out of its course. The impact of the projectile, drainage tubes, packing and probing, probably all contribute to this. I have found one end of the ulnar nerve fastened to the bone, the distal end being attached to the skin. The dissection must be started in normal fascial planes both above and below the injury. Fascial planes can often be followed even when intimately bound together if any trace of them remains at all. Sharp knife dissection and instrumental technic are absolutely essential. Under these conditions, hemorrhage is troublesome but can be controlled with water at 120 F., used in a Gentile syringe or applied on pledgets of cotton. Often extensive dissection can be done with no hemorrhage. When escape of blood does occur, it can be removed by washing it out with Ringer's solution. Hemostasis must be perfect and the wound must be washed free of blood, else scar tissue will re-occur. With the two parts of the nerve exposed the two dissections are united. This dissection of scar tissue necessarily leaves a raw surface. These raw surfaces must be infolded so as to leave all surfaces of the wound covered with fascia that are destined to serve as a bed for the nerve. This is the most satisfactory way of preparing a bed for the sutured nerve, and is done with the idea of avoiding reformation of scar tissue. Other methods have been tried, but are less satisfactory. They include: making new trajectory in normal muscle or fat and investing with various protecting membranes such as sheaths of fascia, sheaths of fat, veins and arteries, autogeneous or formalized, bone tubes, magnesium tubes and rubber tubes. (Full discussion of this may be found in an article by the author in the February number of Surgery, Gynecology and Obstetrics.) After completing a new bed for the nerve the two stumps are picked up and a point is selected free from scar tissue, and a guy-rope suture is so introduced that proper orientation can be maintained throughout the operation. This orientation is important. All intraneural scar tissue must be resected, as both the failures and researches of the war have shown.

Dujarier has compared the appearance of scar with that of normal nerve. Scar has no fasiculi, glistens, is homegeneous, and has little or poor blood supply when compared to normal nerve. The nerve has fasiculi that on cross section appear as small circles of hyalin and bleed on section from minute blood-vessels. The bringing together of a nerve without twisting or altering its anatomical relationship is important. Stoffel has described a funicular arrangement or grouping of fibers persisting throughout the nerve. On cross section the area of each funiculus may represent the supply to some muscle or group of muscles. Grouped about the areas of motor fibers are funiculi of other nerves. Tinel also dwells at great length on funicular topography. These terms, funiculi and fasiculi, are used to express the same structure.

Borchardt says corresponding nerve tracts should be brought into apposition. On the other hand, Heile and Hezel minimize the importance of such orientation, using for an argument, that haphazard suture before such orientation was understood brought good results. Downgrowth of neuraxes, as seen in Perroncito's plates showing regeneration, do not occur in regular columns but often cross ina most irregular manner. Schwann thought it improbable that corresponding fibers as before division unite. Rawa states that nerve centers can innervate organs which do not belong to them as soon as united by nerve conductors. Langley and Anderson, Kennedy, and Flourens found that one nerve could be cut and sutured to another with resumption of function.

Great care must be exercised in exploring scar, for oftentimes intact funiculi will be found. It is always best to save all these. In order to do this, the damaged funiculi must be dissected free and sutured. This must be done with the aid of the electric stimulator. For this purpose I have found the best instrument was an induction coil and two pieces of ordinary insulated wire. The wire was boiled and never got out of order. All complex electrodes do get out of adjustment. When the damaged funiculi have been stutured, the intact funiculi will bulge like the handle of a suitcase, but their neurilemma protect them if the dissection has been carefully done. When it is clear that there is complete anatomical interruption the scar should be removed in the following manner. The ends of the nerve, i. e., the scar ends, are grasped by artery forceps and the trunk put on tension. Then with sharp cataract knife, repeated section is done until normal cross section of nerve has been demonstrated. When the scar has been resected, all intraneural hemorrhage must be controlled. This is best done by applying pledgets of cotton wet in normal salt solution at 120 degrees. It may be necessary to clamp and tie some of the small vessels that occur inside of the nerve. The use of adrenalin or any other chemical agent is contraindicated. The tourniquet should never be used. When it is possible to bring the two scar-free ends of the nerve incontact, immediate suture should be done. Complete liberation of the nerve, transplantion to shorten the trajectory, and flexing the limb, will overcome considerable gaps. I have by this means bridged seven and a half centimetres gap in the sciatic and equal amounts in the ulnar. In these procedures all branches must be preserved. For instance, in bringing the ulnar over the condyles for the purpose of shortening the trajectory of that nerve, we find our mobilization is interfered with by three branches that supply the flexor profundus. These can be lengthened by splitting up the funiculi from which the branches spring for two or more inches. I have done this for a space of five inches without interfering at all with the function of any part of the nerve. When a nerve has been so prepared, if possible the ends are approximated by the guy-rope suture and this is tied. Then very fine sutures are placed in the sheath of the nerve so as to secure perfect approximation of that structure. This is important, for any hole left will allow the neuraxes to escape to become adherent to surrounding structures and to ultimately cause pain. From three to seven such interrupted sutures must be used. I have used very fine silk or 1,500 French linen. In no case have I seen any scar tissue result from these sutures. A little liquid vaseline is placed about the suture, and this is the only investing membrane used. All others, I am satisfied, are useless or actually cause trouble. This opinion is based upon exploration of wounds and such procedures as have been practiced in animal experiments. When the gap can not be bridged by immediate contact of the ends, then there is always one possible way of overcoming the defect,—that is, by the insertion of nerve grafts. Fascial tubes, veins, catgut, and all other devices are uncertain. Autogeneous grafts usually succeed if properly done. In this practice I have had success by using multiple strands of small sensory nerve.

Philipeaux and Vulpian, in 1869, succeeded in transplanting a piece of lingual nerve into the hypoglossal in a dog. Albert, in 1876, transplanted a human nerve from an amputation to a patient. Gluck subsequently revived clinical interest in nerve transplantation.

Several kind of nerve grafts have been made. They comprise: (a) pedicled autografts, suture par glissement (Sicard and Dambrin); (b) free grafts, autografts, homografts, heterografts.

Pedicled transplants are too difficult to come into common use.

With free transplants most investigators have expressed a preference for autografts as against homografts or heterografts. Kilvington places success with autografts at one hundred per cent, with homografts at fifty per cent., and with heterografts at thirty-seven per cent. Forssman ranks autografts first; homografts second; and heterografts third. Forssman compares the use of heterografts to that of bundles of catgut as being equal. Sherren records sixty per cent success with homografts, and forty per cent with heterografts in his

series of collected cases. Experimental figures with one hundred per cent of success in the use of autografts can not be taken as final, so far as clinical work is concerned. Large nerve-trunks for autotransplants are not available in clinical work. To obviate this difficulty, Dean, in 1896, used the radial nerve to supply a defect in the musculospiral. Everyone must admit there is a great discrepancy in size and in the number of axis cylinders between the radial nerve and the musculospiral. To obivate this in some measure, several strands of small sensory nerves have been used. Literature is not very replete with cases reports. Ingebrigtsen reports one failure where he had used a single strand. Dujarier and Francois report several failures. Gibson has reported a case with improvement limited to one muscle. Dejérine and Mouson indorse this method highly but do not cite cases to substantiate the claim. Ingebrigtsen quotes five cases operated upon by Foerster as being followed by improvement.

Homotranplants exhibit wallerian degeneration. Merzbacher considers wallerian degeneration a vital process closely related to regeneration. Therefore, if heterografts do not undergo wallerian degeneration, as claimed by Ingebrigtsen, there is a reason for the preference in favor of autografts and homografts. A series of twenty cases where homotransplants secured from amputated limbs and stored at 0° Centigrade in vaseline had been done, is reported by Dujarier.

These cases have not been operated upon sufficiently long to give definite results. The homograft has the advantage over the autograft in that large-sized trunks may be obtained. However, Maccabruni found that large nerve grafts become necrotic in the center, whether homograft or heterograft. In portions of heterografts well nourished, he found a slightly modified wallerian degeneration. Ingebrigtsen's collected cases give one autograft with one hundred per cent success; three homografts with thirty-three per cent success; and ten heterografts with ten per cent success. The available records of clinical cases are of slight value on account of the short time between the report of the case and the operation. Sherren's collected records of heterotransplants comprise 22 cases, of which 16 were sufficiently late to be of value. Of these, one made a complete recovery and six improved.

The experiments with various grafts done on animals up to the time of Huber were unsatisfactory. There is no conclusive evidence in experiments performed by Gluck, Johnson, Assaky, Bunger, Notthaft, or Willard. Huber performed ten heterografts that survived for one hundred and twenty days or more. These filled defects of six to eight centimeters in length and usually were transplants of cat sciatic into the ulnar of a dog. Of these, five showed regeneration of motor nerves to all muscles, and four showed regeneration of nerves to the muscles of the forearm. These conclusions were reached from making stimulation of the nerve and obtaining muscle twitches, and from histological examination.

Ingebrigtsen made a study of heterotransplant. He concluded that heterografts did not under go wallerian degeneration, but that they became necrotic; therefore, that regeneration could not occur through them. The preponderance of evidence shows that autografts are most susceptible to regeneration, but that some regeneration may occur in a heterograft.

"Nerve crossing" differs from anastomosis in that the entire thickness of both normal and degenerated nerve is cut through and the ends sutured. This was done by Flourens in 1828. Ballance in 1895 made application of this in suturing the facial to the hypoglossal. The greater number of clinical cases of nerve crossing have been done in connection with the seventh nerve. Sherren collected 40 cases of suture of the facial nerve. Of these, 8 were nerve crossing, 6 with the hypoglossal and 2 with the spinal accessory. Voluntary motion occurred in all. There were 32 cases of anastomosis, 20 with the spinal accessory, and 12 with the hypoglossal. While motor improvement occurred in all, the best results so far as disociation movements were concerned occurred in the hypoglossal series.

Kennedy crossed the medial and ulnar to the musculospiral, and secured full restoration of function. By stimulation experiments with the brain he found indications of interchange of cerebral function. Kennedy crossed the spinal

accessory to the facial in a clinical case in 1899. Langley and Anderson crossed the phrenic to the cervical sympathetic; the cervical sympathetic and the recurrent laryngeal; the cervical sympathetic and phrenic. Stimulation of the sutured nerve gave responses corresponding to peripheral distribution. Kilvington divided the sciatic and sutured the peripheral ends of the internal popliteal to the internal and external popliteal. Regeneration was considered complete, but this was not proven by histological examination. Rawa crossed the posterior tibial and peroneal, and stated that nerve centers can innervate organs which do not belong to them as soon as united by nerve conductors.

Other methods have been used to bridge defects in nerves. Various substances have been employed with the purpose of producing either a potential or an actual avenue for downgrowth of axis cylinders. Various absorable materials have been used in the form of a solid cylinder. Other substances less absorable have been used as a tube. This is the so-called "tubular suture". Huber employed bundles of catgut made up of eight No. 3 chromicized threads bound together with fine catgut. With these some regeneration is possible. This procedure differs from Assaky's suture a distance. In the latter a single strain of suture material was supposed to furnish a trellis upon which the nerve might grow. Bone tubes, designated as Van Lair tubes, consisting of decalcified bone, have been used and offer as much success as bundles of catgut. Payr advocated the use of magnesium tubes with the idea of keeping an open channel for downgrowth of axis cylinders. Formalized calf arteries were prepared by Foramitti and used in a few animal experiments. These tubes of Foramitti were employed clinically by Hashimoto and Tokuika in the Japanese-Russian war. Their use was in connection with neurolyses, and does not clearly establish the value of this procedure.

Fascial tubes have been employed by Kirk and Lewis. Nerves will grow down these tubes in dogs with re-establishment of anatomical function. The few cases reported in literature done by this method have not given definite results, especially when operated upon in the presence of scar tissue. Starr stated that he had seen several failures from this operation. The author of this paper has no knowledge of any successful case, but has seen several bad results. Kredel also suggested the use of fascial tubes in 1915.

After suture postural treatment must be employed. The post-operative treatment not only must relax paralyzed muscles but must maintain the position by means of which the nerve ends were approximated at the time of operation. This is best accomplished by large plaster casts designed to accomplish the purpose. In the nerve sutures these casts were kept on for six weeks, when the limb was gradually straightened.

In all but two cases where suture had been done, signs of improvement and promise of ultimate recovery occurred. One neurolysis failed because of inability to recognize intraneural scar tissue. One graft failed probably because the surral nerve used contained no actual nerve substance. Grafting of the external cutaneous showed return of function. In the case where seven and half centimeters had been resected, return of function occurred in five months. One ulnar suture gave poor functional results because of the unwarranted over-stretching of muscles, that could not be overcome by subsequent treatment.

DISCUSSION

DR. A. W. MORRISON, Minneapolis: One of the points that impressed me especially in examining a large number of nerve injuries abroad was the difficulty in determining the severity of the nerve lesion on one examination, and, in fact, it is never possible to differentiate between a complete physiological and a complete anatomical severance except by exposing the nerve. I remember one case, in particular, in which the patient had been wounded in the popliteal space. When examined soon after the injury the typical motor and sensory signs of an external popliteal nerve lesion were present, so that as far as one could tell from the appearance of the wound and from his physical findings the nerve had been severed. On a second examination a few days later, I was surprised to find complete motor recovery, and the area of anesthesia had greatly shrunk and eventually cleared up entirely. Fortunately, I saw this case early in my experience in connection with nerve wounds, and it impressed upon me the difficulty of making an accurate early diagnosis as to the severity of the injury. In talking with other neurologists abroad I found this had been the common experience.

A great deal has been written and said about the

value of Tinel's sign. I think it should be tested for, but not too great stress laid on its importance. As Dr. Hamilton has stated, it signifies only that one or more of the axis cylinders are regenerating. The electrical reactions of the paralyzed nerves and paralyzed muscles are, in my opinion, important, but too much stress should not be placed on any one finding alone.

Incidentally, in this connection it is worthy of note that the slow, worm-like contraction of a muscle to the galvanic current is more significant of the reaction of degeneration than is the reversal of the poles.

The most important signs of severe nerve injury are complete and immediate paralysis of all muscles supplied by that nerve, with intense and rapid atrophy of the muscles associated with marked loss of muscle tone. Accompanying this there will be a gradual change in the electrical reactions and, eventually, a complete reaction of degeneration.

As Dr. Corbett stated, over 60 per cent of injured nerves regenerate spontaneously. There is no question but that the earlier an operation is performed the more satisfactory are the results, but a regenerating nerve is particularly susceptible to mechanical injury, and an early exploratory operation without sufficient indication is to be condemned, as it is likely to injure either the nerve or some of its fibers, or its blood supply. We should not operate on a nerve until we have examined it repeatedly and until we have had the case under observation over a rather prolonged time. A patient's statement as to improvement cannot always be relied upon, for after massage and passive motion had been instituted a number of cases thought their nerve injury was improving; examination, however, showed that a lossening up of adhesions and improvement of the general tone of the muscles was all that had been accomplished.

DR. ARNOLD SCHWYZER, St. Paul: It was very interesting to me to see that some of the conclusions that Dr. Corbett came to, were exactly the conclusions that men on the other side of the trenches had come to, because in a Swiss medical journal I happened to read a short abstract of a German work on the same subject, and it is very surprising how they have come to the same identical conclusions. For instance: Dr. Corbett says that if three months after the healing of the wound there is no restroation of function we had better operate. These other authors say, if four months after the injury we have no signs of restoration of function, that is the best time to operate. We can give about a month for the healing of the wound, and then come to the same date.

The results that the doctor has had, are surprisingly good. The German authors in speaking of direct nerve suture, have had only 60 per cent of final cures. The doctor was not able, on account of the shortness of the time, to say how many complete recoveries he had. The German publications tell us that they had a return of function even two and a half years after operation. That means the patients had a long chance to get their 60 per cent of recoveries. Any one who has seen the delicate, exact and finished technic of Dr. Corbett realizes that this is essential. I would like to emphasize the point that we have no bleeding; that we have no twisting of the nerve; that we have no rough handling or stretching of the nerve tissue. All these things must be (in my estimation) the cause for difference in the percentage of results.

There is one question that would interest us in private work that the doctor did not have a chance to touch on, and that is: Is it very much better, if we have an injury, to unite the nerve right then and there, or if we have good reason to fear severe infection, might we just as well treat the whole wound in the most simple way, paying our particular attention to the infection. Can we promise our patients that after a month or longer that nerve suture will do any good?

Here the results of the Germans have been interesting. I read that they had practically just as good results after three and four and five months after the injury as they had with immediate nerve suture. I suppose that we have to figure that the loss of time was counterbalanced by operating in a cleaner field.

There were even some results reported in cases that were operated on a second time, one and a half and two years after nerve suture.

As to the question of bridging the nerve, when there is too much of a gap: We hear of fine results from bridging nerves, and direct union over a distance of a seven centimeter gap.

To take a nerve from the same person, a sensory nerve, is undoubtedly the best thing to do, and I see that Dr. Corbett did that practically exclusively. You get good results often, and good results are even reported when nerves were taken from cadavers, from amputated limbs, etc.

I would like to close my remarks by asking Dr. Corbett what kind of sensory nerves he prefers to use.

DR. ARTHUR F. BRATRUD, Minneapolis: I have listened to the papers of Drs. Corbett and Hamilton with a great deal of interest, as I have been connected with this work the past year.

In regard to the different lesions involved, I collected a series of 356 cases which I had observed and examined up to March, 1919. And in this series of cases, our ulnar injuries predominated over the musculospiral. Later in the year we received a large number of cases from other hospitals with injuries of the upper limbs, but as yet, however, our ulnar injuries prodominate.

In regard to the D. T. P. sign, we did not attach much importance to it, although with a number of injuries it does aid in localizing the nerve injury. Post-operative, we found it quite valuable in determining the point, to which regeneration had taken place.

Dr. Hamilton spoke about Hypertrichosis and its value in the diagnosis. This occurs in any limb or part of the body where there has been immobilization of the exeremity or protection of the part, or in an

extremity after the same period of rest. The number of cases that went on the spontaneous recovery, was quite high. Up to May 1st we estimated 75 per cent, but at the present time we estimate about 65 per cent to 75 per cent.

I think a good many of the compression injuries should be explored. We had one case of sciatic nerve injury where there was complete recovery in the middle third of the thigh (estimate 80 per cent) in eight months. Numerous cases have shown signs of return in five months. In case of dense neuroma, resection was performed rather than neurolysis.

Splinting is one of the most essential requirements in care of these cases, as Dr. Corbett has emphasized. The splint should be made *for the patient* himself. Anybody who has seen this work, will hold the same view. Improper splinting may be the cause of so marked contraction, especially in the metacarpo-phalangeal joint, as to render the return of function impossible. In one case of suture that I did at the same time a bone graft of the humerous was performed, a splint was applied for two weeks and at the end of this time there was so marked contraction of the metacarpo-phalangeal joint, that patient has not at the end of five months overcome this so-called preventable performity.

Another point emphasized by Dr. Corbett was the fact that the extraneural candition is not indicative of the pathology present.

There is one thing we proved without doubt, and that is, regeneration will take place much quicker in early suture of nerves, also early resection of neuroma, when nearly complete physiological interruption exists. I have sutured two cases of ulnar nerve, upon which neurolysis had been performed, and no return of function in seven months. One of these cases have showed complete return of ulnar function within 90 days. This is the only case of ulnar nerve injury that I have seen return of complete intrinsic muscular action of the hand.

In regard to the technic, there are several points Dr. Corbett spoke about and emphasized, and among them a clean cut dissection and preservation of all branches. With reference to transplant of fascia. Two cases which I have had fat and fascial grafts, which I re-operated showed the fat fasua to be in a very good condition at the end of seven months. A nerve is similar to a telegraph wire. It is irritating to the tissues if without pastiction. A nerve sheath acts as a protection to the nerve similar to a nonconductor.

In overcoming gaps, I use practically the same technic as Dr. Corbett did, viz different positions of the limb, nerve transplants from the leg or forearm and Homo transplants. These latter, taken from amputation cases and preserved in liquid petrolatum on ice. As yet we cannot state the result, but at the present time it is very encouraging.

DR. E. K. GREEN, Minneapolis: I would like to report one case and ask a question of Dr. Corbett as to what is the best procedure, in his judgment, in the matter of determining when to operate.

In civil practice we do not have so many cases as they do in the army, but I had one case which interested me particularly. A railroad man, who was rolled between a car and bridge girder and received a fracture of the humerus had a very positive and definite musculospiral paralysis from the beginning. I think it was about three weeks afterwards we operated on this man to see if we could find out what was the trouble with the nerve. Ordinarily, I think, many of these cases recover without doing anything. In this particular case, however, the proximal end of the humerus had a split in it and the nerve was about three-quarters or four-fifths cut off and pulled into the little splint in the bone, and we had considerable difficulty in releasing it from the bone. With bone forceps we were able to trim off the bone until the nerve released itself and came out. A strip of nerve was intact and we carefully sutured the rest of the nerve end to end. This was before the time of the war, and we were very much disappointed that the man did not show a quick recovery from the musculospiral nerve injury. He left the hospital in two and a half months with almost no use of the musculospiral, and this was before I learned about the cockup splint, and we put him on a straight splint. I did not see him again until about a month ago which was about a year and a half from the time of the injury, when he returned with as perfect motion in the injured hand as in the other one. He was driving a truck and was using both arms with equal dexterity.

The question arises, are we justified in going into these fractures of the humerus for the sake of determining how much injury there is to the nerve? This was not a compound fracture.

DR. E. H. MARCUM, Bemidji: Dr. Corbett asked about front line treatment of these injuries. My experience in this work is limited to the Argonne Forest Drive, and I think there is one thing that impressed itself very firmly regarding the treatment there, and that is this: These nerves should be sutured as soon after the injury as possible. I don't mean to go into the exact suturing that Dr. Corbett speaks of, but, at least, we should strive to get some kind of apposition, so that the neurologist later can find these nerves without having to destroy the anatomical relations of the whole arm in hunting for them. Also, there should be I believe burying of these nerves in muscle tissue as much as possible, because 100 per cent of the wounds were at least potentially infected, if not certainly so, and the amount of pus which runs over the nerves will increase the scar tissue and scleratic condition of the nerves to a certain extent.

Another thing of great importance at that time is your splinting. These three points are the main things to be taken up in the early primary treatment to help out the later results, not that you get any particular action from healing nerves, but just to help out in future work.

DR. CORBETT (closing the discussion): Some of the questions have been asked throw a great deal of light on the subject, particularly this work by Dr. Schwyzer, of St. Paul, on early and late suture.

In going over the history of the past it seems to me, the sentiment is in favor of early suture of the nerve, and the results accomplished by immediate suture of a clean cut nerve were always better than when the suture was done late. But I believe there was a reason for that. When we have a nerve that is recently cut there is no intraneural scar tissue and we do not have to overcome that obstacle. The history of early nerve suture shows that most surgeons neglected the question of intraneural scar tissue. Therefore, the results would be better when the nerve was sutured before there was any opportunity of scar tissue developing in the nerve, but with the proper resection of scar tissue from the inside of a nerve the results of late suture and immediate suture seem to be much the same. However, there is a distinct advantage in the early suture of the nerve. If we leave a cut nerve alone we know that it is going to retract and if the individual is not splinted we know that movement will still further separate the ends, so that it saves an immense amount of dissection for the future and an immense amount of work to get the ends together at once, and if that suture is a failure the nerve is easily found and can be freshened and reunited with very little trouble. So I think the argument is in favor of early suture of nerves in clean wounds.

As to infected wounds, what is the argument there? When a nerve is cut and the wound is infected, not having had experience at the front, I cannot answer from personal observation, but I have talked with those who have had this experience, and particularly with Dr. Carrel, and he told me that important nerves ought to be sutured for two reasons. In the first place, they resisted infection more, and I have seen that. I have seen a large suppurating wound with a nerve crossing through it, in the great suppurating mass the nerve being the only intact structure that was left, with the nerve completely surrounded by pus, and still function of the nerve was apparent. So I really believe with Carrel that these nerves should be sutured. Furthermore, he recommended the use of Carrel-Dakin solution.

As to the kind of sensory nerves for grafts, we want to use a nerve that will give as little trouble as possible. The use of the intercostal nerve has been advocated, but the dissection of that nerve is a difficult job. Keen has advocated the use of the radial nerve, and we know oftentimes when we take out the sensory radial, there is no loss of sensation whatever from doing it. I have repeatedly used the musculo-cutaneous nerve, and of course, when you use that in the foot there is the loss of sensation over the outside of the foot, and it is a question whether we ought to do it. The crural nerve works sometimes, but sometimes it does not. Dr. Schwyzer suggested the ilioinguinal nerve.

Dr. Dyke said how do we know that a motor nerve wont grow down the sensory tract, and what happens if it does? Many experiments have been done to bring together motor and sensory nerves, but for some known chemical or physiological reason we know that a motor nerve will select a motor tract and a sensory nerve will select a sensory tract. There has been a lot of research work done on that during the present war, and an attempt has been made to explain it by using the word neurotrophism, a term coined by Murphy. Just why these nerves try to select their own tracts, I do not know.

ACUTE PERFORATIONS OF STOMACH AND DUODENUM*

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Among the sudden catastrophies which endanger human life must be included acute perforation of stomach and duodenal ulcers. This is fortunately not a frequent occurrence.

The seriousness of acute perforations and the necessity for their prompt recognition and treatment serve as an excuse for reviewing the literature and bringing the subject before this body for consideration.

Perforations are classed as acute, sub-acute and chronic. By acute is meant the sudden giving way of the ulcer base and the injection into the peritoneal cavity of stomach or duodenal contents.

Acute stomach perforations occur most often soon after eating and are near the pylorus in about 80 per cent of the cases. A large perforation allows much stomach contents to escape into the peritoneal cavity and the tendency to spontaneous closure and blocking is less than in the smaller kind. Free perforations in the posterior stomach wall empty into the lesser peritoneal cavity and may cause a subphrenic abscess or a general peritonitis by the flow of the infectious material through the foramen of Winslow. The liquid or semi-soft contents of the stomach soon after a meal is infectious and its injection into the free peritoneal cavity at this time quickly cause a peritonitis. The opportunity for closure of the opening by omentum or by adjacent organs is slight, and an extensive spread of infection is the result.

Perforations of the duodenum differ from the

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above in many respects. Its contents is liquid and nearly sterile and usually does not spread throughout the general peritoneal cavity, but is deflected by the colon along its ascending portion into the right inguinal fossa and pelvis. For this reason it is often diagnosed and treated as acute appendicitis.

There is a considerable tendency toward the self closure of duodenal perforations by the omentum or by the near organs, thus limiting the infection.

If the patient is not too prostrated, he may give a history of digestive trouble of long standing, or he may state that he has never had any previous trouble. The onset is always a sudden agonizing pain in the upper abdomen, with occasional vomiting, fear of death, and considerable shock.

On examination, the patient shows evidence of severe suffering with a varying amount of shock. There is an absence of abdominal breathing and palpation elicits a marked rigidity and tenderness of the abdomen which is characteristic of perforations. The greatest tenderness is in the upper abdomen and if some hours have passed since the onset of the symptoms, the absence of liver dulness may be noted, on account of the accumulation of gas; and there may be a dulness in the flanks due to the presence of free fluid in the abdomen. A leucocytosis is usually present. The diagnosis can ordinarily be made by the consideration of the above symptoms.

In the differential diagnosis, we must consider all causes of acute peritonitis. The first to be excluded is acute appendicitis, which has often been diagnosed when acute perforation was present. Other conditions to exclude are acute perforation of the gall bladder, rupture of an appendiceal or plevic abscess, acute pancreatitis, ilius, and cysts with twisted pedicle.

After a diagnosis of perforation of some kind has been made, it is not well to waste valuable time by hair splitting discussions of the value of the finer diagnostic signs or to postpone the operation to a more convenient time for the surgeon, but to give the patient the benefit of the doubt and advise immediate operation.

Perforations of the stomach are more dangerous than those of the duodenum because of the more infectious character of its contents and the tendency toward its general dissemination throughout the abdomen.

The prognosis depends above all else on the time which elapses between the rupture and the operation. Every hour which passes adds to the danger. Dr. W. H. Mayo states that recovery nearly always takes place if the operation can be performed within ten or twelve hours. The mortality increases between ten and thirty hours. After 48 hours the percentage of recoveries increases. The amount of stomach and dodenal contents which has escaped into the peritoneal cavity and the degree of its infectiousness are important factors in the prognosis.

Undoubtedly a small percentage of patients with acute perforation recover temporarily under medical treatment or the let alone plan, but the number is small compared with that following prompt and efficient operation. As these patients are often in a stage of partial shock and suffering from peritonitis, it is important to use all available means to conserve the patient's strength and resistance. The use of local anesthesia combined with nitrous oxide or small amounts of ether, as well as gentle technique and rapid operating, are important factors in these cases. We have found that the transverse incision has been helpful in most of our upper abdominal cases.

Unon opening the peritoneum free gas and considerable fluid, containing stomach or duodenal contents and occasionally bile, are found. A rapid microscopic examination of the fluid will in case of doubt aid in determining its origin and also its relative infectiousness. If the fluid be tested with litmus paper, an acid reaction is in favor of a stomach perforation. In 1917, Dr. H. L. Baker advocated the giving of three grains of methyline blue in an ounce of water a short time before the operation. This will stain the point of perforation and assist in its prompt location, although light pressure on the stomach or duodenum will usually cause a little fluid to escape and thus enable the point to be quickly located. This opening should be closed with two layers of sutures if possible a tag of omentum should be sutured over it. This stops the leak. The suture should be placed so that it will not constrict or deform the stomach more than necessary. The abdomen should be gently and thoroughly cleansed with saline

sponges, paying especial attention to: (1) the upper abdomen; (2) the renal fossae and (3) to the pelvis.

The question of the necessity of gastro-enterostomy in these cases has been much discussed. Our leading authorities state that if the operation can be done within ten or twelve hours after perforation, gastro-enterostomy should be done. Much will depend upon the patient's condition, the amount of infection and the surgeon's experience as well as the team work in the operating room. If the patient's condition is bad or there is marked peritonitis, the conclusion seems to favor closure of the opening and putting off of the gastro-enterostomy until a later date.

In a perforation of a posterior gastire ulcer, the escaping stomach contents may enter the lesser abdominal cavity. These perforations are difficult to treat and sometimes it is impossible to reach the affected area form behind or through the gastro-colic or gastro-hepatic ligament, and a trans-gastric operation is needed.

In duodenal ulcer the perforation is usually within two inches of the pylorus, on the anterior or superior wall. Closure should be made as in the stomach and gastro-enterostomy performed if the patient's condition warrants. The destruction of the ulcer area by actual cautery, as advocated by Balfour, is an important step. The kind and amount of drainage will differ with each case and with each operator; undoubtedly damage is often done by too much drainage. Careful cleansing of the peritoneum followed by a split tube drain through a small wound over the pubis and small cigarett drains to the primary area of infection, will suffice in most cases. The necessity for drainage increases as the time lengthens between perforation and operation.

The after-care is similar to that of any peritonitis case. Fowler's position, saline hypodermoclysis and proctoclysis, careful stomach lavage for acute distention and abstinence from food for a limited length of time, are important post operative steps. The patient should be kept under careful observation and complications, such as bowel obstruction, secondary abscesses in the abdomen and subphrenic space and other intra abdominal complications, carefully searched for and promptly attended to, if present.

As a prophylactic measure, it may be suggested that all chronic ulcers of the stomach and duodenum be given proper treatment before the patient is subjected to the danger of an acute perforation.

Following is a brief report of our cases:

(1) F. P. Male, age 38, editor: He gives no history of previous digestive trouble, but 48 hours ago he was taken with a sudden severe pain in the epigastrium, followed by vomiting at intervals for 24 hours. The leucocyte count was 18,000.

Operation disclosed free gas and fluid in the abdomen with the intestines so distended that it was necessary to insert a trocar and drain off quantities of gas and fluid contents. On the anterior surface of the duodenum, two inches below the pylorus, was an indurated area in which was found a perforation. The opening was closed with two layers of suture and a posterior gastro-enterostomy performed. Drains were inserted to the abscess site and into the pelvis which was filled with purulent-like exudate.

He recovered without complications and later reported that he was getting on well.

(2) O. O. Female, age 31, wife. Gave a history of digestive trouble for many years. One week before entry into the hospital she was taken ill suddenly with severe upper abdominal pain, and has been very ill since. Her pulse was 120, temperature 100, leucocyte count 25,000.

A short transverse incision was made over the right upper abdomen. Free gas and a dark foul smelling fluid was found with an abscesslike cavity underneath the G. B. On account of the patient's poor condition, nothing further was done and light pack and drainage was introduced. Upon removal of this a few days later, it was found that liquid foods like milk appeared in the wound a few minutes after they were taken by mouth. Five days after the first operation another incision was made and a posterior gastro-enterostomy was done. A hole nearly an inch in diameter was found in the stomach just proximal to the pylorus, the large opening probably being partly due to digestive action. The stomach and pylorus were completely severed, infolded by suture, and free

drainage inserted. After a slow convalescence, she finally recovered and is getting along quite well.

(3) L. H. C. Male, age 24, farm laborer. Has never been ill. Gives no history of indigestion. Four days ago was taken with sudden severe pains in upper abdomen. He vomited frequently and the pain has been continuous since. The examination showed a distended, tender abdomen; white blood count 5,800, no blood in stomach washings. The operation disclosed free gas and sero-hemorrhagic fluid in the abdomen. Intestines markedly distended. Loops of small intestine and omentum were found adherent to the duodenum. On loosening these, a perforation just proximal to the plyorus on the anterior border of the stomach was found. The opening was sutured over and infolded and an anterior gastro-enterostomy performed. Drainage into upper abdomen and pelvis inserted. Convalescence was complicated by bowel obstruction which was relieved by establishment of a fecal fistula. Patient otherwise made a good recovery.

(4) S. K. Male, age 23, farmer. Gives history of stomach trouble for three years. He was given a bismuth meal and an x-ray examination which demonstrated a duodenal ulcer. The following night he was taken with severe upper abdominal pain which continually grew worse, and 13 hours after the onset of this pain he was operated. Free gas, mucus and bile-stained fluid were found in the abdomen. He had a small perforation on the anterior wall of the duodenum. This was sutured and a posterior gastro-enterostomy was made and drains were placed in pelvis and kidney pouches. Convalescence was complicated by a right lower lobe pneumonia and a left-sided phlebitis, and a small intestinal fistula which gradually closed. At last reports he was getting along well.

(5) G. S. Male, age 27 years, farmer. He gives a history of having had epigastric pains three weeks ago, and three days ago he has severe pains in the upper abdomen. He vomited frequently and was unable to expel flatus. Operation disclosed free gas and considerable purulent-like fluid in the abdomen. The small intestines were so distended that puncture was needed for the evacuation of gas and liquid contents. A perforated ulcer of the duodenum two inches below the pylorous was found. This was sutured as usual and a posterior gastro-enterostomy performed and a catheter placed into the lower ilium to lessen danger of bowel obstruction. Drains were inserted into the pelvis and kidney pouches. He made a slow recovery but at last report he was getting on well and had gained 40 pounds in weight.

(6) E. D. Age 31, male, hotel keeper. He had epigastric pains three weeks ago. Three days ago he had severe upper abdominal pains and vomiting and slight jaundice.

Operation disclosed gas and dark fluid in the abdomen, and a perforation in the stomach just proximal to the pylorus. The opening was closed and a posterior gastro-enterostomy performed. He made a good recovery but returned in about six weeks complaining of faintness and history of tarry stools. He was kept quiet a couple of weeks on careful diet and has since given us a good report.

(7) Girl of 18, well developed. She had never complained of any gastric disturbance. She had a sudden excruciating epigastric pain one evening after returning home from a party where she ate a light supper.

She was first seen in consultation two days after the onset of the illness. She was suffering intensely in spite of liberal use of morphia. The temperature was 102, pulse 130, respirations fast. The abdomen was distended and there was marked muscle spasm over the right side. Operation was performed at once in a farm house 40 miles in the country. The right abdomen was found to contain a well walled off cavity containing pus, fibrin and food remnants. A small perforation of the stomach just proximal to the pylorus was found through which was escaping small milk curds. The fluid was acid in reaction.

The perforation was closed with two layers of catgut, which was the only suture material at hand, and a loose pack inserted as drain.

The patient seemed to rally for a day, but death ensued the second day from absorption and general sepses rather than from general peritonitis.

DISCUSSION

DR. R. E. FARR, Minneapolis: Dr. Ramstad has covered in a very classical manner this important

subject which has so many angles that I hardly know where to begin.

Our experience with perforated gastric ulcer has been intermittent. We get them just often enough to keep us on the qui vive. My personal experience covers about 20 cases, and during the earlier years of my practice I would go along for perhaps a year or two without seeing a case.

In the diagnosis, the recognition of the condition is very important. In our first experience with a young girl we made a diagnosis of intestinal obstruction. The condition was diagnosed as soon as the abdomen was opened. I have made the diagnosis of perforated gastric ulcer in every case since that I have operated on. I have also made it in several cases that did not have it. I should have been more alert. In all these cases we have an acute surgical condition and operation is indicated. It is interesting to note that after forty-eight hours the safety of the operation begins to increase rather than decrease with time. In the subacute cases it is a grave question how one should handle these conditions.

I had a man die very suddenly from a terrific peritonitis who was getting along nicely for ten days. He had a perforation of a duodenal ulcer which we thought was fairly covered over, and after repeated consultations I was willing to operate at that time believing I could handle the case all right.

With regard to what we shall do, I have hesitated in most cases to do gastroenterostomy and have contented myself with a complete excision of the ulcer-bearing area. I believe the Balfour method is a good one and gets rid of the indurated mass. I have made a wide plastic covering up the area transversely. This can be done in the stomach and duodenum. I have had no cases in which I could not do this, although there are some in which there is a mass as large as the hand on all sides of the ulcer.

The question of drainage is one of the knotty points of this subject. How much shall we drain, when shall we drain, and where shall we drain? I think it is a common custom to put a drain in the pelvis and one down to the point of perforation. I cannot clearly understand whether drainage in these cases does any good or not. The more I see of drainage, the less I drain, particularly when we consider the work of Richter and other good men who are getting away from drainage in these early cases. I never saw an ulcer that had an opening in it half an inch in diameter that had an acute perforation. Later, when these patients die and you see the ulcer, you may put your thumb into it. A Christian Scientist had one of these perforating ulcers. In this case we opened the abdomen and found an opening in the ulcer in which one could put his thumb. In the early acute perforations they are pin point.

I had a Polish patient who was drinking and eating sausages and a lot of other stuff an hour or two before perforation occurred, and he had very little in his abdomen except his protective fluids.

In the last ten years we have operated on every one of these cases under local anesthesia, and I have been surprised at one thing, namely, the intense board-like rigidity of the abdominal wall, which is the most characteristic point in the diagnosis. It holds the tissues in the abdomen absolutely still. The last patient I had came in on his knees doubled up in the knee-chest position, holding the limbs absolutely rigid. After I had rolled him over and blocked his nerves in the abdominal wall he said he was perfectly comfortable.

In reference to the important question of where pain in the abdomen is produced, I will say that Mackenzie has covered this subject. He believes pain is felt in the thoracic nerves, and not in the abdominal cavity at all. In this case and in several other cases I have seen in which I blocked them with local anesthesia, cases that never went through the excitement of the first stage of general anesthesia and the perfect relaxation of the last stage and that, from the time the perforation took place, held themselves absolutely like a vise—what happened? They held the perforations without leakage in the vast majority of cases. They held them right there in the cases we did under local anesthesia as shown by elevating the abdominal wall, with negative intra-abdominal pressure allowing the stomach or duodenum to drop away from the parietal peritoneum, which was adherent. These little pin point openings do not leak at all, and I believe it is later on that these ulcers leak. A transverse incision, with negative abdominal pressure in these cases, and lifting up the abdominal wall will allow us to see the conditions sufficiently clearly.

One point which the doctor did not cover in the diagnosis I want to refer to, because I believe it is going to amount to something in the diagnosis, and that is a rotgenogram of the free gas in the peritoneal cavity.

DR. J. S. HOLBROOK, Mankato: It seems to me that the subject Dr. Ramstad has brought before us is one of the medical subjects that has turned to the surgical side more than any other. I am sorry the members in the back part of the hall did not hear all of the doctor's paper, because the most important thing he wanted to tell the general practitioner is that when a case occurs in which there is abdominal rigidity and possibly tenderness or vomiting, or some other symptoms, there is an acute surgical condition which ought to be taken care of, and one ought not to wait to make a hair-splitting diagnosis but get the patient into a hospital where he can be cared for.

He says 20 per cent of these ulcers perforate. That is a large proportion. Deaver thinks a little over 5 per cent perforate.

Surgeons have been urging for years that all cases of chronic ulcer of the stomach should be operated on early, just as cases of appendicitis and cancer should be operated on early. We know whenever a patient shows evidence of stomach trouble we should

send him to some one who can make a proper diagnosis and get an operation done before perforation occurs.

Dr. Ramstad has been very successful in his cases, but unfortunately his clinicians did not send the cases within the twelve hour limit. He had one case that came near that limit, and that was in his own practice. He lost but one of the seven or eight patients, but because he did not lose more of them is no reason why we should not operate within the first twelve hours, when possible as this is the safest time.

DR HUGH WILLSON, Minneapolis: I have had a rather peculiar experience with ulcers of the stomach for the last six or seven years. My work has been confined entirely to gastro enterology and practically all ambulatory cases. During these six or seven years we have handled probably in the neighborhood of 300 ulcer cases and of that number, I do not know of any that have had an acute perforation. All cases gave a long history; they were of the type that nature had protected, and in a considerable number of them the ulcer had penetrated, showing an accessory pocket to the stomach. Some of these chronic perforations have been into the liver or pancreas, but of those cases with a long standing history that have come in from a distance, all ambulatory, I do not know of any in which acute perforation of the ulcer had occurred. My impression is that the perforating cases are of a different type. From what I have seen of them and have read of them, they seem to be largely without history. The cases I know of have perforated without previous history, or with a very slight previous history.

My attention has been called to this two or three times by insurance men who have asked me questions on the subject. Recently an acquaintance approached me on the subject and wanted to know how such a thing could happen. He told me he had recently written a $50,000 policy for a man who three weeks later died of a perforated ulcer of the stomach without any previous ulcer history.

The point that strikes me particularly is that the cases of acute perforation belong to a different group from ulcer cases as seen by the gastroenterologist who is dealing with the ambulatory types, where the more or less indolence of the condition gives time to protect by organized exudate and adhesions.

DR. A. F. BRATRUD, Minneapolis: I should like to report six cases of acute perforation of the stomach which were treated a little differently from what Dr. Ramstad treated his cases, with one death. These cases were all treated similarly to those of Dr. Farr with local anesthesia plus ether, or gas and ether. The perforation was located and closed in a matter similar to that described by Dr. Ramstad. A typical jejunostomy was performed in four out of six cases, with recovery in all cases. The jejunostomy tube was covered over the serosa for about an inch and a half and then omentum was covered over the jejunostomy opening. These cases were all given fluid on the table before they left the operating room. I think one very important thing in all these cases is that they are dehydrated and fluids are of great importance. In the one case that died the perforation was of four days duration. That brings up the question whether it is advisable to operate in these cases after a certain period.

We have not been fortunate in obtaining roentgenograms of these cases afterward. Only one case had any trouble to speak of after the jejunostomy, and that patient we fed through the jejunostomy opening thirty days. This man had trouble in taking his food for about three weeks after he began to take food one month after operation. All of the cases are symptomatically free and practically cured so far as the condition is concerned. All cases were practically free from any disension and did not suffer at all from gas pains.

DR. C. P. NELSON, Minneapolis: Acute perforation of a stomach or duodenal ulcer usually calls for an emergency operation, and it is often impossible to secure the services of an experienced surgeon. Because of delay in coming to operation these cases are often not in a condition to stand very much. Prompt action and gentleness is essential. A liberal exposure is necessary. Anterior perforations are readily accessible. If on the superior surface of the duodenum, that can be rotated anteriorly. Armed with a curved round needle, and No. 1 chronic catgut, it is possible to close the perforation quickly with a continuous through and through suture, placed transversely. The suture must not be pulled tight or it will cut through the friable tissues. Then one or two stay sutures placed at a distance where the tissues are in better condition, will assure a position. This should next be covered with a liberal portion of omentum, held in place by a few stitches. If we stop to do much we are apt to loose our patient.

I had a gratifying experience in a case of duodenal perforation of about forty-eight hours standing. The hole was half an inch in diameter. General condition of patient was desperate. Dealing with the situation in the way I have just described, he made a good recovery and has remained well, now nearly a year. No gastro-enterostomy was done, and does not seem to have been necessary. If done at the time, patient would surely have died. There is usually not much drainage in these cases. In the one just mentioned, though there was a large quantity of muco-purulent material in the pelvis, necessitating a supra-pubic drain, there was practically no drainage after the first twenty-four hours.

DR. RAMSTAD (closing the discussion): I was very much interested in what Dr. Bratrud said in reference to performing jejunostomy in these cases. I have no doubt that is a very valuable procedure, especially where peritonitis is somewhat advanced, and it occurs to me and to others with whom I talked last evening that it would be an important procedure in many surgical cases.

In regard to the history, it is undoubtedly true that these patients are suffering so when you first see them, that it is difficult to get a clear history, but we have tried hard to get a history in a few cases, and many of them claimed they had never had any trouble at any time until the acute perforation occurred.

Relative to the use of local anesthesia. I will say that those of you who have not tried it and do not care to work entirely under local anesthesia, will be surprised to see how much better you can begin with the general anesthetic after the abdominal wall has been infiltrated with local anesthesia. It will lessen the amount of ether or nitrous oxid, and the anesthetist will be able to get along with less ether, and the patient will take the anesthetic much better afterwards.

In regard to drainage, I agree with the gentlemen who have discussed this phase of the subject. I believe if we learn our technic better, if we become more and more accustomed to handling these acute cases, we will use less drainage, but we will also be more careful about cleansing the abdomen after operation. We should sponge off carefully, look into all corners, and do as good a job as we can, and be very charry in the use of drains. I suppose we all feel when we see half a dozen drains in the abdomen that the patient has a small chance for recovery. My personal conviction is that fewer drains should be used, but they should be well chosen, well placed, and the abdomen should be thoroughly cleansed before they are inserted.

THE TREATMENT OF FIFTY-ONE SELECTED CASES OF INFLUENZA IN THE EPIDEMIC OF 1920

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During the influenza epidemic occurring in January and February, 1920, fifty-one patients with influenza were admitted to the Stanley Hospital, Rochester, Minnesota. The severity of the disease in these cases was much greater than would be found in the average town or community, since it was impossible to care for all patients in the hospitals. An effort was made, therefore, to admit only those especially in need of hospital attention. A definite diagnosis had been made in all the cases; the complications were only those that accompany influenza.

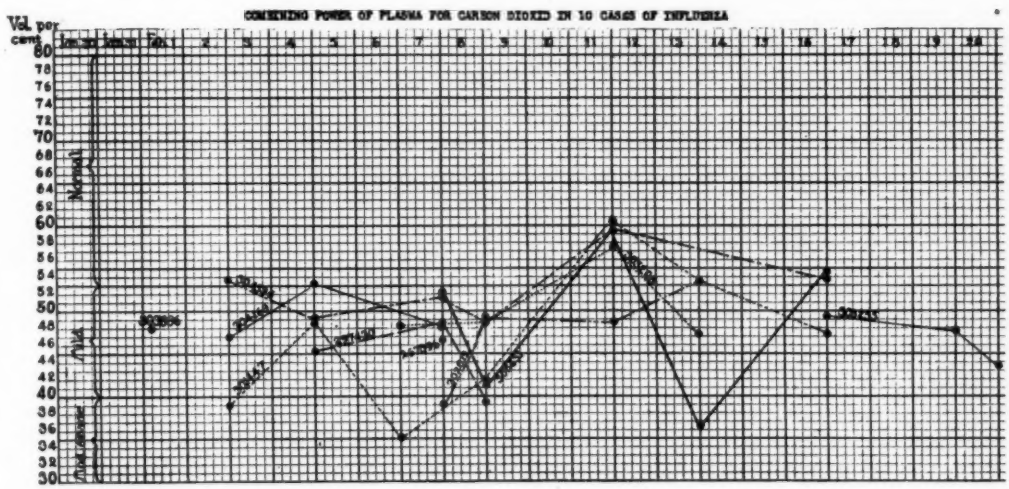
The severity of the disease in the first patients that came to the hospital resembled the severity in those who had influenza in the latter part of the epidemic of 1918. Patients had the symptoms of prostration characteristic of that seen one year before; namely, a chilly and feverish feeling, general muscular aching, malaise, anorexia, and sometimes nausea, headache, and pain in the eyes, in all respects the picture of a person acutely ill.

The records in the histories of these patients showed that a sudden onset had occurred with chill in 46 per cent; a slower onset, usually expressed by a severe cold in the head, followed by weakness and a chilly and feverish feeling in 40 per cent; the onset had been uncertain in 14 per cent.

The physical findings in the early cases were strikingly few. The patients were usually admitted on the second or third day of illness. At this time they were restless, their faces were flushed and usually they had a slight dry cough. The oropharynx, as a rule, was acutely inflamed, but the lungs were apparently normal. In the early stages of the disease there was a noticeable discrepancy between the high fever with severe constitutional symptoms and the absence of any gross local lesion.

Thirty-one of the fifty-one patients had influenza only; their average leukocyte count was 10,000, and the average maximum temperature 102°. Only one of the patients of this group had blood-tinged sputum. There were no deaths. Twelve patients had bronchopneumonia with influenza; their average leukocyte count was 14,000, and average maximum temperature 103.2°. Of this group four patients had blood-tinged sputum and three died. Eight patients had bronchopneumonia and empyema complicating influenza; their average leukocyte count was 31,000, and average maximum temperature 104.1°; two of these patients had blood-tinged sputum and six died, making a total of nine deaths in the fifty-one cases.

The importance of absolute rest and quiet is frequently not given proper consideration in the treatment of influenza. The patient should be put to bed as soon as a diagnosis of influenza is made. Very often the patient will object to this; he is not feeling very ill, and will request to be allowed to use the bath-room. All such privileges should be denied since many



patients are made worse by this unnecessary exposure. Certainly a big step has been taken in the treatment of influenza when the patient is in bed, is feeling fairly comfortable, and is away from all disturbing influences.

Recent literature on influenza contains many interesting articles on the importance of isolation of the patient. Sajous says: "Chauffard, Netter, Vincent and others have called attention to the contagiousness of the complications of influenza. For example, some of the hospital wards would show septicemia, others intestinal localization, and so forth. It is advisable, therefore, to separate complicated cases from those without complications."

Most of the patients in our series occupied single rooms, but as the demands became more pressing two beds were put in the larger rooms. The marked similarity in the temperature charts, physical findings, and general condition of the patients who were in the same room, was observed in a sufficient number of instances to demonstrate the importance of isolation, especially of patients with complications. Plenty of fresh air was supplied and a uniform temperature of about 60° F. was maintained.

After patients had been made as comfortable as possible measures were instituted to combat the toxicity, and to control complications at the earliest possible moment. Maximum elimination means minimum toxicity, but too much enthusiasm in the administration of purgatives often exhausts the patient, and is, therefore, not justifiable. A saline laxative, as a rule citrate of magnesia, was used in our cases.

Large quantities of liquids were given to the patients; the diet was limited almost entirely to liquid foods and during waking hours they were urged to take a glass of water once every hour. If the mouth is kept clean and the water is flavored with a little lemon juice the patient will not object to the amount.

Patients were sponged while perspiring profusely to encourage skin elimination; great care was exercised not to have the temperature of the water at variance with the body temperature, not to expose the patient unnecessarily, and not to move him enough to disturb him. The sponging was occasionally followed by a light massage with dilute alcohol. Sponging was not done to reduce temperature, nor was it done so frequently as to exhaust the patient.

In the first day or two of the illness it was necessary to prescribe for muscular aching; the complaint was successfully relieved by giving about 15 gr. of phenacetin each day for one or two days. If the patient is without pain he is fairly comfortable and will get a maximum amount of rest, but restlessness seems to be a typical phase of influenza, and at times overshadows all other symptoms. Morphin hypodermically and codein by mouth were prescribed, but were used sparingly and only when necessary; no untoward effect could be seen to follow their use. This observation may be at variance with that of Bastedo who says

that morphin should be avoided on account of its tendency to produce edema of the lungs and tympanites.

Some of the patients exhibited gastro-intestinal disturbances, principally nausea and vomiting, and on the assumption that this was the expression of acidosis 3 gm. sodium bicarbonate were given at two-hour intervals until the urine became alkaline. Occasionally, also, a 5 per cent solution of sodium bicarbonate was given by bowel, using the Murphy drip method. In every instance the nausea and vomiting cleared up promptly.

Recent literature contains much comment on acidosis in influenza. Sajous says: "Acidosis is a recognized accompaniment of severe infection. . . . Considerable evidence is available to show that alkalinization of the body fluids definitely assists the organism in its defense against pyogenic germs." In contradistinction to this in Herrmann's series the blood chemistry was observed in twenty cases with the finding that: "There was a marked variation in the alkaline reserve. The fatal cases in the series studied, for the most part, showed a high alkaline reserve, at times approaching alkalosis, others showed a lower reserve. The variation was from 50.19 c.c. the highest, to 37.2 c.c. the lowest. Nine cases showed figures above 45 c.c. and four cases showed figures below 40 c.c. The explanation of the cyanosis on a basis of acidosis was found untenable."

In our series of fifty-one cases thirty-seven determinations of the combing power of the blood plasma for carbon dioxid were estimated in ten cases over varying lengths of time. The Van Slyke method was used. The results are shown in Chart 1. By far the greater number of readings, twenty of the thirty-seven estimations, are between 53 and 40 volume per cent, findings that are, according to Hawk, the limits of a mild acidosis. Five estimations revealed a moderately severe acidosis; the remaining twelve were normal. Of the ten cases studied only five determinations were below 40.

Rosenow's antigen was given, 1 c.c. daily on three consecutive days in all except the mildest cases. This antigen consists of a suspension of approximately twenty billion partially autolyzed pneumococci for each cubic centimeter of solution. Its action in cases of lobar pneumonia has repeatedly been so favorable that it was tried in cases of influenzal pneumonia with the idea of overcoming any pathologic disturbances which may have been caused by the pneumococcus organism.

The small number of patients in this series does not warrant definite conclusions with regard to the value of antigen in the treatment. We observed, however, that it had no ill effect on the patient's general condition. A decrease in temperature was noted in eleven cases immediately after its administration. There was general improvement in the patient's condition in ten cases and no change in eighteen. In the uncomplicated cases in which antigen was used there was an average leukocytosis of 11,000, the average was 9,000 in the cases in which the antigen was not used. The improvement noticed in many cases after the use of the antigen seemed to justify its continuance as a helpful therapeutic measure.

The rule of recovery was by rapid lysis. If the temperature remained normal for about one day the diet was increased, and on the second day a tonic, usually iron, quinin and strychnin, was given. The prostration following influenza so often observed in 1918 was not apparent in most of these patients. On the contrary many of them were anxious to get out of bed before it was even advisable for them to sit up. Sajous states: "Oftentimes an influenza patient after being afebrile some days would experience marked relief from discomfort and even feel well enough to rise from his bed and go out, a rise in temperature would then occur and signs of pneumonia would be discovered." The length of time a patient should be kept in bed after the temperature has become normal should be determined in the individual case. The lungs should be clear and the leukocyte count approximating normal. As a rule the number of days from the time of onset usually marked by a chill to the day the temperature finally remains normal, may be a guide, estimating about one half of this number of days as a suitable length of time to keep the patient in bed after the temperature has begun to follow the normal line.

SUMMARY

A study of fifty-one cases of influenza, occurring in January and February, 1920, shows

that the general severity was not so great as in the epidemic of 1918.

The most important essentials in the treatment of influenza are rest and isolation in the complicated cases, fresh air, and the maintenance of a uniform temperature of 60° F. When indicated, maximum elimination is encouraged by saline laxatives, liquid diet, large quantities of water, and tepid sponge baths whenever perspiration is profuse.

Small doses of phenacetin may be given for muscular pains, and small doses of morphin control restlessness when other drugs fail.

Gastro-intestinal disturbances may be relieved by sodium bicarbonate in 3 gm. doses until the urine becomes alkaline. In this connection it is interesting to note that the estimation of alkali reserve in the blood rarely indicated more than a mild acidosis.

Rosenow's pneumococcic antigen seemed to be a helpful therapeutic measure.

Recovery was by rapid lysis. After the temperature returned to normal the patient was kept in bed for a period equal to one-half of the number of days he had had fever.

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PARALYSIS OF THE ABDUCENS NERVE SECONDARY TO MASTOIDITIS*

By GEORGE C. DITTMAN, M. D.
St. Paul, Minn.

Paralysis abducens as a coexisting complication with suppurative otitis media with or without mastoiditis was first fully described by Gradenigo. While this associated condition had been reported prior to its final grouping in literature, it had not been recognized as a specific element in the syndrome.

*Read before the Minnesota State Medical Meeting, October 1, 2 and 3, 1919, Minneapolis, Minn.

It is primarily the domain of ophthalmology. When occurring as an alarming complication in the course of mastoiditis, the ophthalmologist would be the first consulted, though hope for recovery remains entirely with the otologist.

While syphilis holds the undisputed position as the etiological factor in an isolated paralysis, the subject under consideration is an enlightening example of what the present era of medicine expounds in that great category known as focal infection. For medicine as practiced today demands that the subject be studied from all positions, the local manifestations as well as the underlying constitutional conditions in an endeavor to ascertain the location of the focal infection. With medical progress advancing we are finding more and more that the eye becomes the great interpreter of an existing hidden nidus.

The literature does not abound with isolated case reports on the subject, nor do text books on otology or ophthalmology specifically emphase this complication; Roemer states "The abducens is the most frequently affected of all the nerves of the ocular muscles; it runs over the apex of the petrous portion of the temporal bone and may readily be involved in a circumscribed meningitis," and further on it is remarked "Paresis of the ocular muscles are very rare." Fuchs remarked, "In intracranial paralysis the focus of the disease lies within the cranial cavity." Politzer states, "Paralysis of the abducens nerve seldom occurs in diffuse leptomeningitis purulenta; in meningitis of the posterior cranial fossa, paralysis of the sixth nerve is especially pronounced."

As the complication has certain measured characteristics which warrants it being considered separately and not confusing it with other intracranial complications of otitic origin, it would be better discussed and indexed under the title of Gradenigo's triad or syndrome.

In 1904 before the congress at Bordeaux, Gradenigo described a group of symptoms or a triad characterized by, (1) acute otitis media with or without mastoid symptoms; (2) isolated paralysis or paresis of the abducens nerve corresponding to the side of the diseased ear; (3) excruciating and persistent pain localized in the frontal, temporal and parietal region of the same side.

In presenting the reports of two cases characterized by this syndrome, one after a mastoidectomy and the other treated without operation and both recovering, conclusions cannot be drawn. It may be stated however that recovery of an isolated abducens nerve paralysis abducens nerve paralysis is, according to reports available in the literature, the general rule.

Case 1. P. W., St. Paul, age 17 years, first seen January, 1916, gives a history of a recent attack of influenza, cough, nasal discharge and at first first a serious discharge from the left ear, this later becoming purulent, with pain over the mastoid bone. Shortly thereafter he noticed that on looking at any light he saw two images; he was dizzy when walking and nauseated the greater part of the time.

Upon examination I find the patient emaciated, pale, hemoglobin 70, urine dark amber colored, with no albumen and no casts; temperature 103; frontal and ethmoid sinuses discharging a yellow muco-purulent matter; purulent discharge from left ear through a small perforation in tympanum; vision normal with the exception of diplopia and inability to move left eye outward beyond the middle line. Ophthalmoscope shows no change in the fundus; pupils react to light. Two days thereafter he complained of sharp pains radiating forward toward eye and side of head; to overcome the diplopia he kept the left eye closed; he came to my office for a period of two weeks and the nasal sinuses and ear were treated.

February 18th a mastoid operation was performed; the cells and antrum were completely filled with granulation tissue, although the bone over the sigmoid sinus appeared normal, it was removed; a thin coating covered it. Nothing further was done and the cavity was packed as with an uncomplicated mastoid operation. At the time of operation the emperature was 103, after the operation the temperature fell to 99 degrees.

Thereafter, for several days the temperature rose and fell until it became normal; three days after operation the temporal and parietal pain diminished but the diplopia remained; he was kept for a period of two weeks in the hospital and then reported at my office for dressing. The diplopia lasted for a period of three weeks but the motility of the eye outward did not completely correct itself for some time, for when looking at more acute angles outward he continued to see double images. It required three months for complete recovery from the operation and before the muscle movements became normal.

Case 2. Wm. M., Stillwater, Minn., male, age 12 years, first seen January 20th, 1919. He has recently recovered from scarlatina, is now in a convalescent state, pale, anemic and thin, giving the history of a profuse muco-purulent discharge from the right ear for some time. The mastoid is tender, the auricle protrudes and great pain pain radiates from the ear over the temporal region to the eye and eye lid. Images appear double; he keeps affected eye closed and the head turned toward the left side; he is nauseated a greater part of time, dizzy when walking and at times drowsy.

Examination Hemoglobin 60; urine contains a large amount of albumen, hyalin and granular casts; ear discharging muco-purulent secretion, posterior superior wall of auditory canal normal, small perforation in tympaum, mastoid tender; right eye cannot be rotated outward beyond the median line, a complete paralysis of the external rectus muscle; lid on affected side swollen and reddened from lachrymation; at no time during the period that I saw the patient did he have an elevated temperature. On the contrary it was always subnormal. The ophthalmoscope showed the disc slightly swollen.

Treatment—Operation was urgently advised but the parents would not consent. He was placed in the hospital for one week and treated conservatively; the ear was douched every hour with saline solution, the tympanic opening enlarged and an ice bag put to his head. Thinking the treatment could be carried out equally as well at home and by reporting to the office he left the hospital contrary to advice. Basham's mixture was then prescribed and he was instructed to be under his family physician's observation for the nephritis. During the time he was under my treatment the tympanum was kept wide open by repeated paracentesis, the canal washed out with saline solution and into the middle ear two minums of phenol neutralized with gum camphor were injected every

other day with a small syringe. There is a slight burning after this injection which lasts for a few minutes. A wick saturated with this solution was used as a drain in the canal; negative pressure was used to remove the secretion for the middle ear and the right eye was bandaged; dark glasses gave some relief. March 17th he stated the diplopia was absent; during the course of this treatment the aural discharge gradually diminished; when last seen April 4th the diplopia had disappeared, the gemperoparietal pain and aural discharge had ceased and the tympanum had healed. April 15th the boy's father wrote that his condition was very gratifying and on May 13th he writes from the East where he now resides in a similar vein.

Considering these cases from the symptoms existing, both presented: (1) suppurative otitis media; (2) paretic strabismus; (3) diplopia; (4) intense pain on affected side radiating toward the front; (5) impairment in motility of affected eye; (6) dizziness; (7) abnormal position of head. Case 2 had subnormal temperature and drowsiness, indicative of uremic poisoning or cerebral involvement; likewise the classical symptoms of mastoid involvement, redness, swelling over mastoid, pain and discharge. But these are not the dangerous cases for this is more indicative of a mastoid periostitis.

The common routes of infection into the cranial cavity are either by way of the inner wall of the mastoid or through the roof of the antrum or tympanic cavity. The fact that in Case 1 the inner wall of the mastoid was not diseased and apparently the mastoid involvement of Case 2 was not severe would make it appear that these cases originated through extension from the tympanic cavity.

An extensive review of the literature relating to the subject and occurring up to 1910 was made by C. E. Perkins and published in the Annals of Otology, Rhinology and Laryngology. Out of 95 cases collected eleven died from meningitis; of the eighty-four remaining, recovery of the abducens paralysis occurred in 67, probable recovery in 5, partial in 4, no improvement in 1 and not stated in 6; of 29 cases of abducens paralysis complicating mastoiditis and operated upon there were 27 complete recoveries, 1 death, and 1 failure; of 31 cases not operated upon there were 25 recoveries, 3 failures and 4 deaths.

In a recent case reported both by Dr. P. D. Kerrison and Dr. John M. Wheeler and in which a mastoid operation had been performed, the paralysis of the external rectus recovered the third day after operation and steadly improved thereafter. In two cases reported by Dr. O. Stiekney in the Laryngoscope July, 1919, the paralysis of one recovered in two weeks after operation and in the other there was a steady improvement.

Since intracranial lesions of otitic origin always spread by contiguity from the primary focus, the question arises as to what the muscle palsy is to be attributed. Gradenigo states it is due to a localized meningitis in which the apex of the petrous bone becomes involved; Urbantschitch, Rimini and Geronzi believe the disturbance produced reflexly from Deiters nucleus; Bartels concludes that paralytic strabismus in ear diseases is the result of direct nerve lesion brought about by extension of inflammation from the tympanic cavity or labrynth to the meninges. The subject of nystagmus relates directly to the above theory, for certain forms of squint are due to labrynthine stimuli.

Irritation of one auditory apparatus will cause rotation of both eyes toward the opposite side with marked rotation of the adjacent eye, thus simulating an abducens palsy of that eye, the position lasting but a few seconds. No doubt others have had occasion to note the existence of diplopia following a simple mastoid operation, notwithstanding the fact that the cranial cavity had not been entered or any other trauma administered to the part other than the concussion produced from the mallet and chisel during the operation. In this condition, no doubt, an intense meningeal hyperemia takes place in the region of the petrous bone as a result of the concussion.

Why then the rarity of this complication and syndrome? Considering the great number of cases of suppurating otitis media with mastoid complication occurring each year, can the causative factor not be due to some anatomical anomaly in the course of the sixth nerve?

The abducens nerve originates from an oval

gray mass of nerve cells in the fasciculus teres in the floor of the fourth ventricle, close to the median groove and in front of the transverse striae; it passes down through the pons parallel with the septum and emerges from the transverse groove between the pons and the anterior pyramid, being connected with both. From this point it passes forward and upward as a cord. At a point in the middle fossa it pierces the dura for a short distance, protected only by its sheath. Piercing the dura behind the body of the sphemoid bone it enters the cavernous sinus along the inner wall external to the internal carotid artery emerging through the sphenoid fissure in its lower nasal part to be distributed to the external rectus muscle. The close relationship between the sixth nerve and the fifth nerve which passes over the apex of the petrous portion of the temporal bone and the developed Gasserian ganglion at this point explains the tempero-parietal pain on the affected side.

From the anatomical study as above outlined, it must be concluded that the cause for the complication is due to an abnormal relationship of the abducens nerve with the petrous bone and the fifth nerve, the anomaly made evident by the aural infection spreading by way of the tympanic cavity.

A paralysis of the abducens nerve cannot be treated as an entity, but as an acute manifestation of a focal infection situated within the cranium and as with other symptomatic conditions it must be approached with respect to the other attending factors.

A fatal outcome is not governed by a wide distribution of the pathologic process, for meningeal inflammation of contiguous etiology is more favorable for recovery than a meningitis secondary to labrynth infection. Primarily, then, it is to be considered as a localized otitic meningitis and as such the prognosis is more favorable.

In cases presenting definite mastoid symptoms, operation is indicated early. With others a free drainage through the tympanic membrane is imperative. Suppurative otitis media is not fatal per se, but as the result of complicating intracranial infection.

DISCUSSION

DR. H. I. LILLIE, Rochester: Gradenigo originally reported fifty-three cases of patients with homolateral abducens paralysis in acute mastoiditis. Five of these cases were examined at post-mortem and the cause of death was meningitis. In three cases a localized abscess was found at the apex of the temporal bone; the petrous portion was unusually pneumatic. Infection had spread along the bony portion of the eustachian tube to Dorello's space in which the sixth nerve is extradural.

Wilkinson suggests stripping the dura over the petrous portion in order to drain this region, and this has been done in most cases presenting this syndrome.

Gradenigo's description of the pathology; that is, localized meningitis or abscess seems the most reasonable, despite the spontaneous cures reported.

My personal experience has been the observation of three cases presenting this particular syndrome. One case which Dr. Shambaugh has reported elsewhere, occurred in which an abducens paralysis followed injury to the carotid artery in doing the radical operation. Another case, of brain tumor with a typical syndrome, in which there was a chronic suppurative otitis, followed the radical operation and on exploration of this apex region the patient's pain was greatly relieved. He died several months after from a tumor originating in this region. A recent case, in a baby sixteen months old, where there was a double syndrome; that is, both sides. The patient recovered but is deaf, apparently. Thus it is seen that the syndrome can be present in pathology other than infection.

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EDITORIAL

THE MINNESOTA STATE MEDICAL ASSOCIATION

The program of the annual meeting in St. Paul this month which appears in this issue reflects great credit on the program committee. The subjects are well distributed and the speakers representative. It is to be regretted that more physicians from the smaller cities and country districts did not avail themselves of the opportunity to take an active part in the program.

Three visitors will add considerable interest to an already attractive schedule. No surgeon in the country is better known than Dr. Joseph A. Blake of New York. His activities in the American Ambulance at Neuilly, outside of Paris, in the early days of the world war, established new methods in the handling of fractures which methods were later adopted by our medical corps abroad. It is difficult to measure the value of such service as he gave for his methods were preventive as well as actively surgical. He will speak on "The Handling of Fractures."

The speaker on the medical side, Dr. Joseph L. Miller of Chicago, is well known as a research worker, internist and teacher. He came into additional prominence during the war when he was summoned to Washington from the base hospital at Camp Dodge where he was in command, to become the Executive Officer of the Department of Reconstruction. Dr. Miller possesses an unusual combination of personal qualities and will be heartily welcomed by his many friends in Minnesota. He will clear up some of the difficulties in medical diagnosis.

We are told that a treat is in store for us in the form of an address from a representative of the American Red Cross. We are to be given the details of the Red Cross Peace Program. This remarkable organization which did such incalculable world wide good during the war has seen the vision of its possibilities for good along public health lines in peace times. This is an international program. We as physicians are actively interested more particularly in what this program means for our country.

The regular program will contain a medical symposium on tuberculosis and a surgical one on local anesthesia and will cover the field remarkably well in both branches.

It has been advocated that the association appoint a censor committee to pass on each paper before it is read at an annual meeting. At present the chairmen of the sections are more or less responsible for the programs in their sections. While anyone who has a subject to present before the meeting is invited to take part, it is the duty of the chairman to prevent duplication and arrange the best program possible. Wouldn't it be well to do away with any personal element which occasionally becomes apparent when the chairman has to refuse a place on the program, by having a censor committee? At present only the author and his subject are known to the section chairman in advance. A man's message on any particular occasion does not always come up to the mark.

When it comes to the publication of articles there is a further weeding out process by the Editing and Publishing Committee. This does not prevent rejected articles from appearing in other journals with the stamp of the Minnesota State Medical Association attached.

THE AMERICAN ROENTGEN RAY SOCIETY

It is proper that attention should again be called to the meeting of the National X-ray Society at Rochester and Minneapolis this month. The Roentgen Ray is of use either diagnostically or therapeutically in every branch of medicine. For this reason every physician in Minnesota who possibly can should take advantage of the opportunity afforded by this meeting to post himself on the subject of X-ray and its sphere which is daily broadening. Roentgenologists will be here from all over the country and many new ideas will most centainly be offered.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNESOTA STATE MEDICAL ASSOCIATION

The annual meeting of the State Association will take place Wednesday, Thursday and Friday, September 29, 30 and October 1, 1920. All the meetings will be held in the Old State Capitol Building, but headquarters will be at the St. Paul Hotel.

The House of Delegates will convene at 2 o'clock, Wednesday afternoon, September, 29th.

The first scientific session is scheduled for Thursday morning at 9 o'clock. Thursday afternoon the joint session will be addressed by Governor Burnquist of St. Paul. Immediately following this Dr. Joseph A. Blake of New York will give an oration in surgery and Dr. Joseph L. Miller of Chicago will give an address on "Some of the Present Problems in Internal Medicine".

The third scientific session will begin at 9 o'clock Friday morning and at the last session Friday afternoon, President Adair will give his address.

A representative of the American Red Cross will give an address on the Peace Program of the Society.

A smoker Thursday evening will be devoted to distinctly non-scientific subjects.

Special entertainment is to be provided for the ladies.

Hotel reservations should be made through Dr. G. K. Hagaman, Lowry Building, St. Paul.

Programs and detailed information will be mailed to the members a few days preceding the meeting.

TENTATIVE PROGRAM OF MEDICAL SECTION STATE MEDICAL ASSOCIATION

Dr. E. L. Tuohy, Duluth, Minn.—"A Dental and Medical View of the Relationship between Alveolar Infection and Constitutional Disease."

Dr. F. C. Rodda, Minneapolis—"Hemorrhagic Diseases of the New-born".

Dr. L. G. Rowntree, Mayo Clinic—"Diabetes Insipidus and Water Balance in the Body".

Dr. G. D. Head, Minneapolis—"Acute Lymphatic Leukemia".

Dr. Walter Sheldon, Mayo Clinic—"Traumatic Ulnar Neuritis—a Neurological Study".

Dr. Max Seham, Minneapolis—"Cardiac Disease in Childhood".

Dr. C. E. Riggs, St. Paul—"Three Neuropsychiatric Notes—Epilepsy, Lethargic Encephalitis and The Dementia Praecox Syndrome". Discussion: Dr. C. R. Ball, Dr. S. Marx White.

Dr. E. T. F. Richards, St. Paul—"Study of the Action of Camphor".

Dr. A. T. Henrici, University of Minnesota—"Fungus Infections".

Dr. J. L. Miller, Chicago, Ill.—"Some of the Present Problems in Internal Medicine".

Dr. W. P. Larson, University of Minn.—"The Use and Abuse of Vaccines".

SYMPOSIUM: "The Diagnosis and Treatment of Early Pulmonary Tuberculosis".

Dr. F. W. Wittich, Minneapolis—"Classification and Symptomatology".

Dr. J. W. Bell, Minneapolis—"The Physical Signs".

Dr. W. R. Ramsey, St. Paul—"Symptoms and Diagnosis in Childhood".

Dr. F. S. Bissell, Minneapolis—"The Roentgen Diagnosis".

Dr. W. J. Marcley, Minneapolis—"Treatment".

SURGICAL SECTION

Dr. Joseph A. Blake, New York—Oration in Surgery on "The Mechanical Treatment of Fractures".

Dr. Harry P. Ritchie, St. Paul—"Treatment of Hare-lip and Cleft-palate".

Dr. R. E. Farr, Minneapolis; Dr. Arthur Bratrud, Minneapolis; Dr. S. R. Maxeiner, Minneapolis—"Symposium on Local Anaesthesia".

Dr. E. Starr Judd, Rochester—"Cysts of the Pancreas".

Dr. W. E. Sistrunk, Rochester—"Mixed Tumors of the Parotid".

Dr. J. Pemberton, Rochester—"Surgical Considerations of Sub Sternal and Intrathoracic Thyroid".

Dr. C. H. Mayo, Rochester—"Cholecystectomy without Drainage".

Dr. T. L. Chapman, Rochester—"Factitious Toxicity of Previously Simple Goiters".

Dr. Arthur Strachauer, Minneapolis—"Surgical Treatment of Cerebellar Hemorrhage in the Newborn".

Dr. William R. Murray, Minneapolis—"The Diagnosis and Indications for Operation in Acute Mastoiditis".

Dr. B. A. Pratt, Minneapolis—"The Smith-Indian-Fisher Intracapsular Operation for Cataract."

Dr. Frank E. Burch, St. Paul—"Ocular Tuberculosis".

Dr. L. W. Morsman, Hibbing—"The Uses and Advantages of Electric Driven Bone Surgery Equipment".

AMERICAN ROENTGEN RAY SOCIETY

The annual meeting of this national society will take place September 14th to 17th inclusive. A preliminary session will be held at Rochester on Tuesday, September 14th and members and guests will come from Rochester to Minneapolis by special train on Tuesday evening. The meeting will be resumed at the Hotel Curtis, Minneapolis, September 15, 16 and 17, 1920. An attendance between five and six hundred is expected.

Dr. Robert Knox of London, England, who is a well known radiologist will take part in the meeting. Dr. Walter Alvares of the University of California will give the Caldwell Lecture on "Perstalsis in Health and Disease".

The program includes:

Dr. W. T. Bovie: "A Rational Basis for Sensitometry".

Dr. Dallas B. Phemister, Chicago: "Studies on the Reduction of Bone Density".

Dr. W. H. Stewart, New York: "A Revised Estimate of the Value of Pneumoperitoneum".

Dr. G. E. Pfahler, Philadelphia: "New Roentgenographic Technique for the Study of Thyroid".

Dr. Kennon Dunham, Cincinnati: "A Review of X-ray Chest Examination".

Dr. Preston M. Hickey, Detroit: "Paper on Mastoids".

Dr. W. W. Watkins: "Syphilitic-Tuberculous Symbiosis in the Lungs".

SIOUX VALLEY MEDICAL ASSOCIATION

At the twenty-fifth annual meeting of the Sioux Valley Medical Association at Sioux Falls, S. D., June 23 and 24, the following officers were elected: President, Dr. Ernest A. Jenkinson, Sioux City, Iowa; Vice Presidents, Drs. Charles L. Sherman, Luverne, Minn. and Goldie E. Zimmermann, Sioux Falls, S. D.; Secretary, Dr. John A. Dales, Sioux City, Iowa; Treasurer, Dr. Walter R. Brock, Sheldon, Iowa.

CAMP RELEASE DISTRICT MEDICAL SOCIETY

The regular July meeting of the Camp Release District Medical Society was held at the Log Cabin, Ramsey State Park at Redwood Falls, on July 22nd.

After disposing of the regular routine of business the Society had the pleasure of listening to a paper by Dr. Earl R. Hare of Minneapolis, which was followed by a general discussion by the members present.

At the conclusion of the meeting the visiting members and their families were entertained at dinner at the Hotel Ramsey by the local medical fraternity of Redwood Falls.

The officers of the Society are:

R. C. Adams, President, Bird Island.

M. M. Hauge, Vice President, Clarkfield.

H. E. Peterson, Secretary-Treasurer, Granite Falls.

TRI-STATE DISTRICT MEDICAL SOCIETY

The annual assembly of this society whose membership includes the entire three states of Iowa, Illinois and Wisconsin will be held at Waterloo, Iowa, October 4, 5, 6, 7, 1920. The physicians of Minnesota who are in good standing in their State Societies are most cordially invited to attend the meeting, and participate in the program. Entertainment will be furnished for the doctors' ladies. A large number of essays and discussions will be furnished by the physicians of the middle west. Among the prominent physicians who have been invited and who have accepted places on the program are the following: Drs. George W. Crile, Cleveland, Ohio; Harvey Cushing, Boston, Mass.; Robert T. Morris, New York City; Robert B. Osgood, Boston, Mass.; Lewellys F. Barker, Baltimore, Md.; Harlow Brooks, New York City; Alfred Stengel, Philadelphia, Pa.; William Engelbach, St. Louis, Mo.; Leonard G. Rowntree, Mayo Clinic; John F. Binnie, Kansas City, Mo.; Hubert Work, Pueblo, Colo.; Commander William S. Bainbridge, U. S. Navy, New York; Surgeon-General Hugh S. Cumming, U. S. Public Health Service, Washington, D. C.; Charles L. Mix, Chicago, Ill.; Carl B. Davis, Chicago; Daniel R. Carman, Mayo Clinic, Rochester, Minn.; and General John J. Pershing, Washington, D. C.

OBITUARY

DR. GEORGE W. McINTYRE

Dr. George W. McIntyre of St. Peter died July 11th, 1920 at the age of 67. He was born at Cleveland, Ohio, September 28, 1853. The family continued to make their home at Cleveland until 1857 when they moved to Wisconsin where they lived until 1861. Dr. McIntyre received his elementary education in the schools of Wisconsin and also attended an academy at River Falls. He received his medical education at the Minnesota Hospital College, Hamline University, St. Paul. After some years at the St. Peter State Hospital as assistant physician, he engaged in private practice in the city of St. Peter.

Dr. McIntyre is survived by one daughter, Miss Millie McIntyre, who is a nurse at the Johns Hopkins hospital at Baltimore. He also has one brother Loranus McIntyre of River Falls, Wis.

DR. E. E. WELLS

Dr. E. E. Wells of Stillwater died at his home in that city on May 17, 1920, after a week's illness with pneumonia.

Ernest Eldred Wells was born on a farm near Rockford, Ill., on Dec. 8, 1870. He attended a country school and then the high school at Winnebago and a business college at Rockford. He studied medicine

at Northwestern University, graduating in 1898. Thereupon he came to Stillwater, Minn., where he was interne at the City Hospital for one year. In his early practice Dr. Wells was temporarily located at Spring Valley, Wisconsin and Barnum, Minnesota, after which he practiced for two years at Moorhead, Iowa. In 1903 he located in Stillwater, which continued to be his field of labor for the rest of his life. Dr. Wells held several public offices. At the time of his death he was county physician and formerly he was coroner of Washington County and an alderman of Stillwater. He was a member of the Minnesota State Medical Association and the Washington County Medical Society, at one time being secretary of the latter, and was active in its last reorganization in 1917. He was an ardent member of Masonic organizations and was affiliated with several other fraternal orders. During the World War Dr. Wells served as a member of Medical Advisory Board No. 52. His ambition was to enter the military service, but he was disqualified for physical reasons.

On August 5, 1903, Dr. Wells was married to Miss Eva McLaggan of Stillwater, who survives him and is patiently bearing a double burden, she having been disabled for a number of years by illness. They have two children, Adele, age 14, and Janet, age 10. The doctor is also survived by one sister, Mrs. A. E. Evans of Hunter, Wash. His mother died when he was sixteen and his father lived to the ripe age of 83, passing beyond just three months before the son. Of late years the father required a great deal of surgical as well as medical attention and Dr. Wells was at his side continuously at the Rockford home during the last six months, except for occasional visits to his family in Stillwater.

DR. GEORGE L. GATES

Dr. George L. Gates, pioneer physician of Winona, died at the home of his brother in St. Paul, July 4, 1920. He was 82 years old and practiced in Winona for 40 years. His wife died 22 years ago. He was a member of the G. A. R. and was a Mason. He was born in Connecticut and came to Minnesota shortly after the Civil War.

MINNESOTA PUBLIC HEALTH ASSOCIATION COLUMN

By Dr. H. W. Hill, Exec. Sec. M. P. H. A. Shubert Building, St. Paul, Minn.

THE WINTER'S PROGRAM

Beginning now, and growing we hope to a climax in December, the next great enterprise of the Minnesota Public Health Association is to engineer such a Seal Sale in Minnesota as will put definite Public Health progress next year as far beyond that of this year, as this was beyond that of the year before.

The intensive campaign is in December, preceding Christmas, but the preparations for it are now going on quietly, widely—we hope with a grip on the situation never before in our power.

The other great enterprise for the Winter contains three subdivisions: one, the securing of some progressive public health legislation; another, the prevention of legislation of a retrogressive nature; finally we hope to see developed during this Winter a closer alignment of the State Medical Society with the public health movement—a direct taking part by the medical profession through its representative state body of a portion of the state public health work, as the American Medical Association takes a part in national matters.

This will necessarily consist in cooperation with the public in some line of medical service. As suggested in a previous article, the first thing to do is for the County Medical Society to get in touch with the public, county by county, through the County Public Health Association. Out of that should grow the second step; a cooperative service in each county, perhaps along the general line of developing the periodic examination idea. This is the way to prepare to meet, even to forestall, the chaos which nationalized medicine, not properly prepared for, is likely to precipitate.

NEW AND NON-OFFICIAL REMEDIES

During July the following articles have been accepted by the Council on Pharmacy and Chemistry for inclusion in New and Nonofficial Remedies:

Armour & Co.:
- **Tablets Anterior Pituitary 5 grains.**
- **Tablets Ovarian Substance 5 grains.**

Hynson, Westcott & Dunning:
- **Lutein, Sterile Solution of**
- **Ovarian Residue—H. W. D.**
- **Tablets Ovarian Residue—H. W. D.**

Merck & Co.:
- **Bengyl Benzoate (Merck).**

Organic Salt & Acid Co.:

Benzyl Benzoate (Organic Salt & Acid Co.)

Seydel Manufacturing Co.:
Benzyl Benzoate (Seydel).
E. Fougera & Co.:
Riodine.

Pollen Antigen-Lederle (Fall Type).—A liquid obtained by extracting equal parts of the pollen of ragweek, goldenrod, wormwood and maize. Each cubic centimeter contains 14,000 pollen units (a pollen unit is the equivalent of 0.001 Mg. of pollen). This liquid is made into fifteen different dilutions. The product is supplied in packages containing the fifteen dilutions (to be used for prophylactic treatment), in boxes containing five of the dilutions (series A, B and C, respectively, and in packages containing a single tube (for diagnostic use). Lederle Antitoxin Laboratories, New York.

Whole Ovary — H. W. D. — The ovarian gland of the cow, including the corpora lutea, freed from extraneous matter and dried in vacuo. For actions and uses, see general article on Ovary (New and Non-official Remedies, 1920, p. 201). Whole Ovary —H. W. D. is sold in the form of 5 grain tablets only. Hynson, Westcott & Dunning, Baltimore.

Benzyl Benzoate—Abbott.—A brand of benzyl benzoate (see New and Nonofficial Remedies, 1920, p. 49) complying with the N. N. R. standards. It is also supplied in the form of Elixir Benzyl Benzoate —Abbott and Benzyl Benzoate Tablets—Abbott 2 grains. Abbott Laboratories, Chicago.

Benzyl Benzoate—Fritzsche.—A brand of benzyl benzoate (see New and Nonofficial Remedies, 1920, p. 49) complying with the N. N. R. standards. Fritzsche Brothers, Inc., New York.

Benzyl Benzoate—Merck.—A brand of benzyl benzoate (see New and Nonofficial Remedies, 1920, p. 49) complying with the N. N. R. standards. Merck & Co., New York.

Benzyl Benzoate—Organic Salt & Acid Co.—A brand of benzyl benzoate (see New and Nonofficial Remedies, 1920, p. 49) complying with the N. N. R. standards. Organic Salt & Acid Co., New York.

Ampules Ven-Iron Cacodylate.—Each ampule contains 0.03 Gm. (½ grain) of ferric cacodylate (see New and Nonofficial Remedies, 1920, p. 44). Intra Products Co., Denver, Colo.

Ampules Ven-Iron Cacodylate.—Each ampule contains 0.03 Gm. (½ grain) or ferric cacodylate (see New and Nonofficial Remedies, 1920, p. 44) in physiological solution of sodium chloride. Intra Products Co., Denver, Colo. (Jour. A. M. A., July 3, 1920, p. 35).

Diphtheria Toxin—Antitoxin Mixture (Gilliland).—Each cubic centimeter of diphtheria toxin-antitoxin mixture (see New and Nonofficial Remedies, 1920, p. 264) represents three lethal doses of toxin and approximately 3.2 units of antitoxin. Marketed in packages representing one immunizing treatment, and in packages containing ten treatments. Gilliland Laboratories, Inc., Ambler, Pa.

Gonococcus Glycerol—Vaccine (Lederle).—A suspension of killed gonococci in a vehicle of glycerol and physiological solution of sodium chloride. For a discussion of gonococcus vaccine, see New and Nonofficial Remedies, 1920, p. 283. Marketed in packages of fifteen vials containing progressive amounts of the vaccine (Jour. A. M. A., July 17, 1920, p. 177).

PROPAGANDA FOR REFORM

Acriflavine G H and Proflavine G H.—Acriflavine and proflavine have been admitted to New and Nonofficial Remedies. However, the products sold by the Heyl Laboratories as "Acriflavine G H" and "Proflavine G H" have not been accepted for New and Nonofficial Remedies because (1) their quality did not conform to the Council's standards and (2) in the advertising issued for these drugs the manufacturer failed to give the unfavorable as well as the favorable clinical reports that have been published (Jour. A. M. A., July 3, 1920, p. 51).

Antidote for Snake Poison.—No Anti-venom for snake poison has been accepted for New and Nonofficial Remedies. Experiments looking toward the production of anti-venom for snake poisoning seems to have met with some success, but the use of these products in therapy is still in the experimental stage. In general it has been shown that an anti-venom prepared for one species is not always effective when used against the venom of another species (Jour. A. M. A., July 3, 1920, p. 51).

Products of the American Organotherapy Co. — Dr. Alfred A. Lowenthal has announced a "Post Graduate Course of Lectures and Clinics" to the physicians of Chicago, Denver, St. Louis, Columbus, etc.—and incidentally brings to the attention of the medical world the alleged virtues of the products of the American Organotherapy Company. A few years ago, the American Animal Therapy Company of Chicago put out such products as Lymphoid Compound (Lowenthal), Ova Mammoid (Lowenthal) and Prostoid (Lowenthal), and these products were exploited to the public (Jour. A. M. A., July 3, 1920, p. 49).

Echitone and Echinacea.—A circular entitled "Skin Lesions of Unknown and Uncertain Origin" sent out by Strong, Cobb & Co. is devoted to the exploitation of "Echitone", stated to contain echinacea, blue flag and pansy. Several years ago, the Council on Pharmacy and Chemistry examined "Echitone" and rejected the product because unwarranted therapeutic claims were made for it and for other reasons. The drug echinacea has been claimed to be a "specific" for rattlesnake bites, syphilis, typhoid, malaria, diphtheria and hydrophobia. It has also been credited by enthusiasts with curative effect in tuberculosis, tetanus and exophthalmic goiter, and with the power of retarding the development of cancer.

The Council on Pharmacy and Chemistry examined the claims made for this drug and reported that there was no reliable evidence in substantiation of the claims made for it. Echinacea is one of the many vegetable drugs introduced by the eclectics without a rational basis for their use (Jour. A. M. A., July 17, 1920, p. 193).

Na Versus K.—Advantages of sodium over potassium salts: (1) **Rational therapeutics.** Sodium compounds are as efficient as, in many instances better than the corresponding potassium compounds. Potassium is more toxic. (2) **National aid.** Accustom yourself to use sodium, an abundant natural product of the United States. The home of potassium is Germany, which, to its own commercial gain, popularized potassium drugs. (3) **Price.** Sodium salts are cheaper. Potassium is, relatively speaking, a foreign substance in the body. Potassium and sodium salts are prescribed mainly for the effects of the radicle they carry. It is illogical, therefore, to administer potassium acetate or potassium bromid when sodium acetate or sodium bromid can more readily be given. In spite of the smaller demand, sodium salts are on the whole cheaper than potassium salts and, should the medical profession prescribe the sodium more generally, all of those that might be used in medicine would be less expensive than the corresponding potassium salt (Jour. A. M. A., July 17, 1920, p. 192).

Boracetine. — Boracetine (F. E. Barr & Co., Chicago) in 1919 was heralded as "The Guardian of Health". It was claimed to be "an all-around antiseptic, especially good for pyhorrea, sore gums, sore throat, etc., excellent for cuts, bruises, insect bites, skin eruptions and, in fact, any condition when an efficient healing agent and germ destroyer is needed". It was also recommended to "get rid of that 'dark brown taste'." Indirectly Boracetine was also claimed to be a preventive of consumption, scarlet fever, diphtheria, etc. From the analysis made in the A. M. A. Chemical Laboratory it appears that Boracetine is nothing more wonderful than **Liquor Antisepticus, N. F.** with a dash of formaldehyd. The more "patent medicines" are analyzed the more obvious becomes the commercial wisdom of the nostrum interests to fighting formula disclosure. Secrecy and mystery are the "back bone" of the "patent medicine" industry (Jour. A. M. A., July 17, 1920, p. 192).

Chaulmoogra Oil in Leprosy.—The results obtained with the treatment of lepers at the leprosy investigation station in Kalihi, Hawaii, with the ethyl esters from chaulmoogra oil have been encouraging. It will require, however, some time to determine whether a real cure for leprosy has been discovered (Jour. A. M. A., July 24, 1920, p. 263).

Chemotherapy of Tuberculosis and the "Cerium Salt Treatment".—Koch studied the effects of many chemical substances, including a gold cyanid compound, on the growth of the tubercle bacillus in cultures, and concluded that all these substances remained completely inactive when tested upon the tuberculous animal. Compounds related to guaiacol and creosote came to have a widespread reputation as tuberculocidal agents without any one's taking the trouble to ascertain definitely whether they really had any particular capacity to injure tubercle bacilli in the test tube, the tuberculous animal or the consumptive patient, although the German manufacturing chemists provided innumerable proprietary derivatives of these drugs. Some time before the war, a "complex lecithin-copper compound" of unannounced composition was put forward in Germany. Another copper cure came from Tokyo, "cyanocuprol" of Koga. Other copper compounds, such as copper arsphenamine, also were brought out. But none of these copper compounds have settled the tuberculosis problem. Recently, newspapers have given publicity to the treatment of tuberculosis by the so-called cerium earth salts in France. It appears that a few observations have been made on the inhibitory action on the growth of tubercle bacilli of salts of cerium and some other rare earth metals. The inhibitory action was less than that observed in the past for other chemical substances, and there is no record of experiments to determine their effect on experimental tuberculosis. Possibly cerium earth salts help the tuberculosis; the evidence so far presented, however, is nothing to get excited about (Jour. A. M. A., July 24, 1920, p. 246).

More Misbranded Drug Products and Nostrums.—The following products have been the subject of prosecution by the federal authorities under the Food and Drugs Act: Seelye's Wasa-Tusa, Dr. Seelye's Compound Extract of Sarsaparilla, Seelye's Laxa-Tena, Seelye's Cough and La Grippe Remedy and Seelye's Fluorilla Compound (A. B. Seelye Medical Company) were misbranded because the therapeutic claims were unwarranted. Aspirin Tablets (Verandah Chemical Company) were misbranded because they contained no acetylsalicylic acid (aspirin). Dr. Grove's Anodyne for Infants (Smith, Klein & French Company) was misbranded because the therapeutic claims were unwarranted and because the carton failed to contain a statement of the quantity and proportion of morphine and alcohol contained therein. Cacapon Healing Water (Capon Spring Company) was adulterated in that it consisted in part of a filthy, decomposed and putrid animal and vegetable substance and misbranded because the curative claims were unwarranted. Seawright Water (Seawright Magnesian Lithia Spring Company) was adulterated in that it consisted in part of a filthy and decomposed vegetable substance (Jour. A. M. A., July 24, 1920, p. 261).

Benzyl Benzoate.—The chemical properties of benzyl benzoate have been known for years. Its therapeutic properties as an anti-spasmodic have been known only a short time. Before this new addition to our materia medica can be given thorough

clinical trial, it is necessary that the products be of a quality sufficiently pure for medicinal use. For the physician's protection, as well as for an aid to the manufacturer, the A. M. A. Chemical Laboratory, at the request of the Council on Pharmacy and Chemistry, has elaborated purity standards. It has also examined the market supply and found that, on the whole, the nonproprietary medicinal brands are of a satisfactory grade for clinical use (Jour. A. M. A., July 31, 1920, p. 335).

A Shotgun Mixture.—It is stated that the following prescription is used with success in "intestinal cases of a medical type": zinc sulphocarbolate, 0.5; bismuth subnitrate, 15.0; bismuth betanaphtholate, 8.0; camphorated tincture of opium, 15.0; syrup of acacia, 30.0;; elixir lactopeptine, to make 130.0. In this, the chief active ingredients are bismuth subnitrate and camphorated tincture of opium. The zinc sulphocarbolate is superfluous. The action of the bismuth betanapholate probably does not differ from that of bismuth subnitrate, and cinnamon water or simple elixir might as well be substituted for elixir lactopeptine (Jour. A. M. A., July 31, 1920, p. 335.)

OF GENERAL INTEREST

Dr. George McGreight of Albert Lea has returned from Siberia.

Dr. H. C. Ericksen of Stanley, Wisconsin, has located at Northfield.

Dr. H. V. Hanson formerly of New London has located at Hutchinson.

Dr. A. Shedlow who has just graduated from the University will locate at Gully.

Dr. R. I. Hubert formerly of St. Paul has moved from Bellflower to Los Angeles, Cal.

Dr. E. W. Hansen of Minneapolis was married to Miss Erna Gaustad of Minneapolis on July 11.

Dr. Harry E. McKibben of Hector was married April 10th to Miss Anna Edstrom of Omaha.

Dr. P. M. Hall, superintendent of the State Sanitarium has returned from the Adirondacks mountains.

The Trempealeau-Jackson-Buffalo County Medical society held a meeting the week of June 14th in Winona.

Dr. J. J. Heimark of Rochester has gone to Fargo to take charge of the Radium work in St. Joseph's hospital.

Dr. J. G. W. Havens of Owatonna has moved to Austin where he has become associated with the Austin Clinic.

Dr. and Mrs. J. Landenberger of New Prague are taking a trip to the coast and will return about September 1st.

Dr. D. H. Nusbaum of Lakefield has returned from Philadelphia where he took a post graduate in ophthalomology.

A physician is wanted at Good Thunder, Minnesota. Mr. C. G. Schroeder of that town will give particulars to those interested.

Drs. B. J. Branton and C. J. Ehrenberg of Minneapolis have moved to Willmar and have become associated with Dr. B. J. Branton.

Dr. Alberta M. Greene has returned from Siberia and will resume her former position on the staff at the State Hospital at Fergus Falls.

The Crookstone Clinic with offices in the Wallace Block, Crookston, has been organized by Drs. J. F. Norman, F. M. Dryden and Ralph L. Kirsch.

Dr. H. G. Blanchard, who for the last twenty-three years has practiced medince in Waseca has sold his practice to Dr. H. A. Miller of the Mayo Clinic.

Dr. Elias Porter Lyon, dean of the Minnesota Medical School, was granted the degree of Doctor of Laws by the St. Louis University, June 7, 1920.

Dr. H. E. Richardson, who has served as deputy coroner of Hennepin County for the last eight months, has resigned to enter private practice in St. Paul.

Dr. F. P. Silvernale, who has just finished internship at the City and County Hospital, St. Paul, has become associated with the Silvertsen Clinic of Minneapolis.

Announcement is made of the opening of a new school in Minneapolis, privately owned, for backward and nervous children. The school will be known as the Baker-Bartholomew School and will maintain an efficient corps of teachers. Dr. W. A. Jones and Dr. Bruce W. Jarvis, well known specialists of Minneapolis, will act as medical advisers.

Dr. Robinson Bosworth, President of the Mississippi Valley Sanatorium Association, who has been in Memphis, Tenn., since last fall, superintending the construction and organization of the Oakville Memorial Sanatorium, will soon return to resume his work as Executive Secretary of the Advisory Commission of the Minnesota State Sanatorium for Consumptives.

Those desiring space for exhibits at the State Medical Meeting may secure same by communicating with Dr. John S. Abbott, Lowry Building, St. Paul. Considerable space is still available.

PROGRESS

Abstracts to be submitted to Section Supervisors.

MEDICINE

SUPERVISORS:

F. J. HIRSCHBOECK,
FIDELITY BLDG., DULUTH.

THOMAS A. PEPPARD
LA SALLE BLDG., MINNEAPOLIS

THE OPHTHALMOLOGICAL FINDINGS IN LETHARGIC ENCEPHALITIS, WITH A REPORT OF SEVEN CASES: Hiram Woods (Arch. of Ophth. vol. 48, No. 6) in his paper entitled, "Some Cases of Lethargic Encephalitis", treats in detail the ophthalmological symptoms in this condition in a manner that hitherto had not been made a special study.

Of the seven reported cases, two gave a history of an antecedent influenza although the third gave a doubtful history of this affection. In one of the cases there was an optic neuritis and this was of a low grade. The rarity of this latter finding is in accord with the observations of others and can be accounted for by the lack of inflammatory and pressure symptoms so characteristic of the disease. In three of the seven cases there was a severe impairment of accommodation, with pupils dilated, sluggish, and at times wholly inactive. In addition in one case, because of the age of the individual the accommodation could not be accurately tested although the pupils presented a similar condition. These four cases presented other defects; in one there was involvment of other branches of the third nerve, in two there was an implication of the sixth nerve, in three an involvment of the facial nerve. The spontaneous cure of the musculature of the globe both intrinsic and extrinsic is common although the paralysis of the intrinsic musculature is the last to disappear. In five of the seven cases there were nystagmoid movements, and in two of the total this symptom was the only ocular symptom. This nystagmus bore no definite relation to the axis of the voluntary movements of the eyes e. g. upon lateral movements of the eyes the nystagmoid motion might either be verticle or rotary.

In the explanation of these various muscular phenomena the author is inclined to accept the premises of Meiland, namely that the symptoms vary according to whether the disease manifests itself as an encephalitis inferior or an encephalitis superior. He contends that in those cases showing ocular paralyses the condition is doubtless one of encephalitis inferior with lesions of the brain stem varying from the level of the anterior tubercles of the corpora quadrigemina, along the floor of the fourth ventricle to the level of the nucleus of the sixth nerve. The lesions are sometimes irritative sometimes inhibitory but never destructive. The paralysis of the intrinsic or the extrinsic musculature supplied by the third nerve is selective according to the group of ganglion cells involved. The nystagmoid movements may be accounted for by a lesion of the transverse fibers connecting the nuclei of one side with those of the other, or a lesion involving the posterior longitudinal bundle which connects the nuclei of the third, fourth and sixth nerves. In this connection a lesion of the association fibers cannot be excluded.

P. D. BERRISFORD.

RELATIONSHIP OF INFLUENZA TO CLINICAL PULMONARY TUBERCULOSIS: Martin F. Sloan (Sixteenth Annual Meeting National Tuberculosis Association, St. Louis). Science pretty generally recognizes that every individual who reaches the age of fifteen has been infected by living tubercle bacilli, the specific cause of every form of tuberculosis. Clinical tuberculosis in the adult, in the light of research and compared with acute illnesses may be said to be a secondary disease in that it is so often preceded by a more active pathological process. Without minimizing the importance of the tubercle bacilli in the campaign against tuberculosis more emphasis should be given the predisposing factors and more strenuous effort made to eradicate them. The elimination of alcoholism as a sociological problem is the hardest blow yet struck in the campaign. Campaigns against the acute illnesses, typhoid, pneumonia, small pox, scarlet fever, etc., have been waged for years and have been productive of results. Because of the periodicity of influenza in epidemic form not so much attention has been given it as its importance justifies.

Reviewing the statistics of patients admitted to Eudowood Sanatorium from October 1st, 1918, to September 30th, 1919, most of whom were examined by him prior to admission, the author found that of the 188 admitted 53 (28%) gave a history of having had influenza; 9 were known to have had clinical tuberculosis at one time or another, 14 gave a history of symptoms that made him feel they must have had clinical tuberculosis, but no diagnosis had been made; 30 (16%) denied any symptoms whatever referable to the lungs prior to influenza. Inasmuch as the influenza morbidity of Maryland paralleled that of two or three other states and that of the Nation at large, he suspected influenza had played the same role generally in activating tuberculosis. Subsequently, he sent a questionnaire to 90 sanatoriums scattered throughout the country and received complete and useful answers from 28. Of a total of 7,714 patients admitted to these 28 sanatoriums from October 1st, 1918, to September 30th, 1919, during the period most reasonable to expect the presence of definite post-influenza tuberculous cases, 2,098 (27½%) gave a history of having

had influenza; 416 had been diagnosed tuberculous prior to the influenza; 525 had had definite symptoms, but no diagnosis had been made; 1,157 (15%) denied any history or signs referable to the lungs prior to the acute illness. Thus it seems that influenza gave to the sanatoriums of the country 15% of the cases demanding treatment during the stated period. The author feels justified in saying that influenza has been the largest predisposing factor in activating the cases of clinical tuberculosis of today and every effort should be made to control and exterminate it. Sixty-five per cent of the post-influenza cases showed tubercle bacilli in the sputum. Patients with active advanced tuberculosis with a history of sickness extending back to an attack of influenza during the first epidemic are yet coming into the dispensaries and sanatoriums undiagnosed. Warning is given to physicians to regard with grave suspicion every patient with lung and constitutional symptoms dating back to the first or second epidemic of influenza. Repeated physical and sputum examinations should be made in every case and X-ray examinations should be resorted to when advisable. Many lesions thought at first to be residual pneumonia have yielded tubercle bacilli after numerous examinations. X-ray plates, besides showing a predominating non-tuberculous lesion near the base of the lung have shown an obscure tuberculous lesion at the hylus extending toward the apex.

THE ROENTGEN RAYS IN THE DIAGNOSIS OF APPENDICITIS: George E. Pfahler (Am. Jour. Roent., Feb. 1919) says that while in the majority of cases roentgenology is not necessary to make a diagnosis of appendicitis, yet there are a number of borderline cases where the symptoms are puzzling in which a complete roentgenological examination will give very valuable information and often prove absolutely the presence or absence of chronic appendicitis. He gives a lot of instructions as to his technic which may be worth repeating.

The patient is given a preliminary purge, preferably of a bottle of citrate of magnesia, at 9 p. m. on the evening before the contemplated examination and presents himself at 9 a. m. the following morning without breakfast, at which time a careful study is made of the gall bladder region as well as a lookout kept for any possible kidney stones. The chest is next viewed fluoroscopically to detect any abnormalities there which might have a bearing on the abdominal symptoms.

The patient is then given a drink of 2 ounces of barium in one pint of buttermilk and the stomach and duodenum are studied. He is viewed again 3, 4 and 6 hours after taking his barium meal and if the stomach and duodenum are negative he is seen again 8 hours after his first drink. At this time the material had entered the cecum and ascending colon and sometimes the appendix may be viewed. The patient is again seen 24 hours after his first drink, at which time the cecum and ascending part of the transverse colon are usually well filled and the appendix can often be demonstrated. Later the patient may be finally seen again 48 hours after his first drink and if necessary at this time a barium enema may be given to recognize any constriction or filling defects.

The following diagnostic points are to be sought: 1. **Localized tenderness.** This is the most valuable sign of chronic appendicitis and may be elicited by palpation under the fluoroscopic screen or with the "distinctor." If the appendix is found filled with barium, pressure over the appendix causes pain and if the pain moves with the movement of the appendix we have a diagnosis absolutely confirmed. Furthermore, if the appendix is pathologic the tenderness, once found, is persistent throughout the course of the examination. Vague tenderness is most likely to occur when the appendix is retrocecal.

The author says, "If no tenderness is present and if at the same time the cecum is freely movable, I believe that no appendicitis exists. On the other hand, if there is localized tenderness over the cecum with fixation of the cecum and no visualization of the appendix, it very frequently means the obliteration of the appendix by an inflammatory exudate which prevents the appendix from filling with the barium meal.

"Localized tenderness with fixation of the cecum but without filling defect of the cecum is, I believe, a strong evidence of appendicitis."

Oftentimes the roentgenologist will find that the tender spot in McBurney's region supposed to cover the appendix is not over the appendix at all, but with the variation of position of the cecum and appendix, the appendix may be some distance away. This, of course, gives valuable aid in a differential diagnosis.

2. **Demonstration of the appendix.** Case, of Battle Creek, as demonstrated the appendix in 30 per cent of his cases, but there seems to be no unanimity of opinion among the roentgenologists as to the significance of the finding of a barium-filled appendix, some men saying that if the appendix is demonstrable it is evidence that it is pathologic. Case takes the middle ground, claiming that the appendix which can be filled with barium, if not actually pathologic, is at least potentially dangerous. Some authors agree with Case when the barium remains in the appendix 48 hours or more after it has passed out of the contiguous colon.

3. **Fixation.** A chronically inflamed appendix tends to become adherent either at its tip or along its course. 4. **Position.** Normally the position of the appendix is downward, but it may lie in any position and it is apparently proved that a non-adherent appendix may change its position during 24 or 48 hours by its vermicular movement. In general it may be said that if the appendix is found directed upwards it is more likely to be pathologic.

5. **Kinking.** If there is a constant angulation it is pathologic, i. e., due to adhesions. 6. **Constriction.** Constriction, dilatation or irregularity in the lumen are pathologic. 7. **Abnormal retention.** If the appendix remains filled with barium after the cecum and ascending colon have been empty, or even the entire colon is empty, it is pathologic.

CHAS. N. HENSEL.

HISTO PATHOLOGY OF BRAIN ABSCESS: Geo. B. Hassin, (Arch. Hem. and Psych., Vol. 111, No. 6). The author begins his article by describing the histopathologic picture in an acute brain abscess following otitis media. He then takes up the conditions he found in an eight year old indurated abscess. Here he found a connective tissue capsule one-quarter of an inch thick resembling the dura. The source of this connective tissue element he has determined to be the blood cells, lymphocytes changing progressively to fibroblasts and connective tissue cells. In the subarachnoid spaces and in the vessels of these brains he determined the presence of debris of lymphocytes, nuclei and lipoid substances, while no signs of inflammation could be made out in the pia-arachnoid itself. The experiments of Weed, who determined the course of absorption of Prussian blue precipitate and of Forrester who found india ink granules in the subarachnoid space after injecting it into cerebral substance are cited in support of his findings in brains with abscesses that the natural course of waste elements from the brain is by way of Virchow Robin's perivascular spaces toward the subarachnoid spaces.

J. C. MICHAEL.

ACUTE INFECTIOUS ENTERITIS WITH POLYNEURITIC SYNDROME: Farnell & Harrington (Am. Jour. Med Sci., July, 1920) describe an epidemic of acute infectious enteritis with polyneuritic symptoms which occurred at the Rhode Island State Hospital for Mental Diseases. In calling attention to this development, they refer to the work of Orr and Ross, in their experiments on the lymphogenous infection of the central nervous system and Rosenau's work on the selective action of bacteria on the tissues of the body. Homan and Laitnen's work with the injection of streptococci into the sciatic nerves of animals is also recalled particularly in relation to their accumulation in the lymphatic spaces of the nerve sheath, and their transmission along the nerve sheath to the spinal root into the meninges and from there into the peripheral zones of the cord.

Rather as a strange coincidence, the work of Orr and Ross was done experimentally with the staphylococcus. The series of cases described by the writers also shows the presence of staphylococci. The staphylococcus aureus varies greatly in its virulence and Rosenau has produced symptoms in the various tissues of the body by the use of staphylococci cultivated to various periods of time, concluding therefrom that there are statges in the evolution of all bacteria which will produce a body reaction for that particular stage in which it happens to enter the body.

The epidemic in question occurred between July 15 and August 6, 1917. Patients were promptly isolated and quarantined. Fifty-one patients were the subject of their study. The onset was characterized by typical acute gastro-intestinal disturbances, nausea, vomiting, diarrhoea with blood, elevation of temperature, prostration, headache and backache. The ensuing neuritic symptoms were of the peripheral type, with marked pain on pressure, with usual absence of the patellar reflex, and with marked asthenia. In a few cases there was complete paralysis. The first cases were the most severe and showed the slowest improvement. Cases were divided into three groups. Of these groups nineteen were found to have definite neuritic symptoms in addition to the gastro intestinal disturbance; seven of them showed the neuritic symptoms to a lesser degree, and twenty-one disclosed little or no evidence of a peripheral neuritis. Some of these cases are described in detail.

In an effort to ascertain the source of infection in the gastro-intestinal tract, cultures were made from the milk used at the institution and staphylococci were obtained in the cultures in rapidly growing colonies. These were also obtained in the excreta and in the discharge from the nose and throat. These organisms were also found in the urine and in the blood. They therefore believe the infection to be of hematogenous origin. Four of these cases came to autopsy and in each instance the liver was found to show signs of degeneration or focal necrosis. Sections of the peripheral nerves and of the mid-dorsal cord showed small hemorrhages between the nerve fibers as well as the nerve root attached to the cord. There was no evidence of involvement of the anterior horns. They conclude therefore that a staphylococcus infection was the cause of this syndrome; that it was introduced into the gastro-intestinal tract causing acute infectious gastro-intestinal symptoms; that staphylococcus septicopyemia resulted therefrom, and that the organism had a particular selective action upon the peripheral nervous system.

F. J. HIRSCHBOECK.

RECOVERY FROM TUBERCULOUS MENINGITIS AFTER TREATMENT WITH INTRASPINAL INJECTION OF ANTI-MENINGOCOCCIC SERUM: Hollis & Pardee (Arch. of Int. Med., July, 1920). Only forty cases of unquestionable tuberculous meningitis have been reported heretofore as terminating in recovery, and the authors are reporting four cases of the disease which have terminated in this way. During recent years the increased exactness of diagnosis of this disease due to the use of spinal fluid examination has resulted in a paucity of reports of cured cases. Since 1910 only eleven cases have been

reported as recovering with treatment. The criteria of diagnosis being the clinical course, the cell count and differential count of the spinal fluid, the finding of tubercle bacilli in the fluid, and the demonstration of the disease in inoculated guinea pigs, the last two being the only real proof. Several other cases are reported as having recovered in which positive evidence of the disease was not obtainable but in which the diagnosis rested upon the presence of tuberculosis elsewhere in the body or on the clinical course of the disease. The authors report two undoubted and two doubtful cases of tuberculosis meningitis with recovery.

The treatment used by authors other than the present writers have been chiefly in the way of repeated spinal puncture as recommended by Oppenheim. Tilli used autoserotherapy by injecting under the skin from one to three c. c. of spinal fluid every three days. With this technique he obtained recovery in a child 18 months of age. Aside from this case no positively tuberculous case has terminated in recovery with any specific line of treatment aside from the repeated spinal puncture.

In the cases reported by Hollis & Pardee, intraspinal injections of anti-meningococcic serum were given at three day intervals. Each one of the four recorded cases terminating in their recovery, out of seven cases in which it was tried.

The writers believe that the action of the antimeningococcic serum is based on two factors: firstly, in the way of adding certain anti bodies which the body is unable to develop itself; and secondly, by the introduction of a foreign protein in the form of horse serum, the irritative effects of the latter producing a cellular response through hyperemia about the site of the localized tubercles. As usual in these cases, the introduction of the serum was preceded by an evacuation of the spinal fluid.

In view of the ineffectual treatments heretofore employed, the writers suggest this as an alternative in cases of this type, as a result of the success attained at their hands.

F. J. Hirschboeck.

STUDIES ON EXPERIMENTAL PNEUMONIA. III. SPONTANEOUS PNEUMONIA IN MONKEYS. IV. RESULTS OF PROPHYLACTIC VACCINATION AGAINST PNEUMOCOCCUS IN MONKEYS: Francis G. Blake and R. L. Cecil (Jour. Exper. Med. May, 1920). The third paper of this series deals with the features of an epidemic of pneumonia among the monkeys utilized for the experimental work.

Paper four describes the experimental methods used in attempting to protect monkeys by means of vaccine. Large and small, single and repeated doses of vaccines failed to prevent the onset of a pneumonia, although the bacteremia was to some extent controlled and the mortality lower in the vaccinated animal. The leucocyte count was not influenced and the disease was not shortened either in experimental or spontaneous pneumonia. Apparently Type I vaccine confers no cross immunity against other types. Comparison is made between results obtained with lipo vaccines and saline vaccines. The latter seems more constantly to stimulate the formation of circulating antibodies. The age of the vaccine is an important factor in its antigenic value.

Because of the susceptibility of monkeys to pneumococcus infection, a strict analogy cannot be drawn between pneumococcus immunity in monkeys and pneumococcus immunity in man.

Thomas Albert Peppard.

INTRASPINAL TREATMENT OF SYPHILITIC AND PARASYPHILITIC AFFECTIONS OF THE NERVOUS SYSTEM: Marinesco (Revue Neurologique). This very interesting and important contribution by the well known Roumanian neurologist concerns itself chiefly with some of the author's new observations on the use of salvarsanized injections *in vivo* and *in vitro*. In the introduction the writer shows that it was he who first introduced the subdural form of treatment for nervous syphilis which he reported in the beginning of 1911 in the "Riforma Medica". He points out that Swift and Ellis began intraspinal treatment in 1912 and complains that American and German writers particularly gave Swift and Ellis the credit that was really due him.

Marinesco cites his researches on the introduction of coloring substance as trypan blue, methylene blue, etc., into the subdural space in the spinal cord and brain, also by the vascular route, the carotid artery and jugular vein. In the latter, coloration was observed only in the meningeal vessels and in the mere outer surface of the cortex, whereas in the former, using an idiot child and a dog, he observed immediate colorations diffused in the perivascular spaces, deep as well as superficial, in the adventitial sheaths, in the neuroglia cells and their prolongations. The base of the brain as well as the convexity showed the deep colorations. The author completed courses of treatment in fourteen cases of tabes and paresis, but cites three cases of paresis only. One, a well developed case, received two series of weekly intradural treatments for six weeks each, and she has been clinically cured for five years. Marinesco believes that the curative value of the serum lies in the presence of antibodies and not in the salvarsan. He believes that cases of paresis should be treated very early by the intravenous, intraspinous and intraventricular route.

J. C. Michael.

SURGERY

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THE CHLORINE ANTISEPTICS: Lee (Ann. of Surg., Vol. 31, No. 6) states that it was not until the use of antiseptics was approved in a scientific way by Wright, Dakin, Carrel, and Dehelley, with adequate analysis of the chemical, physiological, biological and pathological factors involved, that any knowledge of the subject was obtained.

That human tissues have a very definite vital resistance to bacterial infection has been conclusively demonstrated in the recent surgery of gunshot wounds. It is because of this vital resistance of the tissues that it has been possible to practice, in the war wounds, primary and delayed primary suture without the use of antiseptics. This resistance of the tissues is modified by constitutional disease, fatigue, shock, hemorrhage, and starvation, and the necessary degree is not always attainable. For these reasons surgeons will still require a certain amount of help from antiseptics in a definite proportion of infected traumatic wounds of civil life.

The new work on antiseptics may be said to be based upon the following principles: 1. Adequate active mass or concentration of the antiseptic, the necessary time of action and perfect contact between the reagents. 2. That the germicidal activity of all agents depends to an extraordinary degree upon the media in which they act, almost invariably the maximum in distilled water or Salt solution. 3. That chlorine could be presented to the human tissues without the destructive effect which has prohibited its use in the past, has been one of the surprising developments of the surgery of the war.

Dunham found that Dakin's solution of hypochlorite affected the tissues in an inverse proportion to their blood supply. The work of Hartwell and Butler corroborated this experimental work of Dunham. They showed that while no action of the hypochlorite solution was noticed on living muscle tissue, with its rich blood supply, the relatively avascular tendon and cartilage was rapidly dissolved unless protected by active suppuration and exudation. Clinical experiments during the past few years have shown that the hypochlorite solution can be used with impunity in peritoneal cavities in which there are abnormal exudates, as in appendiceal and pelvic abscesses. The presence in these peritoneal exudates of the necessary mass of chemical protein and its union with the active chlorine given off by the Dakin's solution results in the formation of a chemical barrier which protects the normal peritoneal tissues from the destructive solvent action of the hypochlorite solution.

The chemical reactions which occur when chlorine is presented to the tissues, as in hypochlorite solutions, are almost infinite. The chlorine as it splits off from the sodium compound, among numerous other reactions, unites with the protein to form an amino-radical to form more stable compounds which are known as chloramines.

The direct germicidal effect of all the chlorine antiseptics is dependent upon the liberation of their chlorine, and the combination of this chlorine with bacterial protein. The synthetic chloramines are more stable compounds of chlorine than the hypochlorite. The hypochlorite solutions are indicated where there are large masses of dead or devitalized tissue or profuse tissue exudate which cannot be removed by mechanical means. The chloramines are indicated where there is but little, if any, dead tissue, and where the wound exudate is moderate in amount.

E. M. JONES.

OPERATIVE INJURY OF THE COMMON AND HEPATIC BILE-DUCTS: Daniel N. Eisendrath (Surg., Gyn. and Ob., July, 1920). Acidents during operations on the bile-ducts are not infrequently due to variation from the normal distribution of the blood vessels of the biliary region as well as the unusual modes of union of the bile-ducts.

Observations familiar to the surgeon who wishes to minimize accidents to these structures are as follows: (1) In standard textbooks the cystic artery is described as a single vessel arising from the right hepatic shortly after the latter passes behind the main hepatic duct. The mode of union of the cystic and hepatic ducts is stated as being always of the acute, angular type. No mention is made of the plexus of veins and arteries lying on the surface of the common duct which cause an obstinate hemorrhage if overlooked. (2) The right hepatic artery varies greatly in its relation to the main hepatic and cystic ducts. (3) The variations in the course of the gastroduodenal artery and its branch, the pancreaticoduodenal, must be borne in mind. (4) The cystic artery does not always arise from the right hepatic artery after the latter crosses the right edge of the main hepatic duct. (5) There is a single cystic artery in only 88 per cent of persons. When single, the cystic artery does not always arise from the right hepatic. An overlooked cystic artery arising from the gastroduodenal may cause severe bleeding when accidentally divided. (6) In 12 per cent of persons there are two cystic arteries, both of which do not arise from the right hepatic. In the author's case, after one cystic artery has been ligated, severe bleeding occurred from an overlooked second cystic artery, and the hepatic duct was included in the grasp of the forceps while an attempt was made to control the hemorrhage from the retracted stump. (7) In 75 per cent of persons only, the cystic and hepatic ducts unite at an acute angle. When this occurs, the terminal two centimeters are firmly held together by fibrous tissue. In seventeen per cent the ducts pursue a parallel course before they unite. (8) Anomalies in the

hepatic and common ducts may be found (a) as variations in the mode of union of the right and left hepatic ducts before the main hepatic duct is formed, (b) as accessory hepatic ducts or (c) as a double common duct. The author has made drawings which show such variations very clearly.

The author has collected fifty-one cases of injuries of the bile ducts, due either to errors in technic or to anatomical variations; he has divided them into four groups: (1) Cases in which the injury was recognized at the time of the operation or shortly thereafter, and immediate repair instituted. Twenty-six cases belong in this group. (2) Cases in which immediate or early repair of the injury was not successful, so that a secondary operation was necessary. There were four cases in this group. (3) Cases in which injury was overlooked at the time of the primary operation, so that only a secondary operation (usually for structure) was performed. There were fourteen cases in this group. (4) Miscellaneous cases.

In analyzing the fifty-one cases the author reveals five modes of injury; they are as follows: (1) A resection of the juncture of the cystic, hepatic, and common ducts (twelve cases). (2) Tear, ligation, or division of the main hepatic duct during cholecystectomy (nineteen cases). (3) Common duct resections (sixteen cases). (4) Anomalies of the hepatic duct (one case). The case reported by Kehr was one in which the right hepatic duct emptied into the cystic duct and was included in the clamp applied to the cystic duct. (5) Ligation or resection of the main hepatic or common ducts during efforts to grasp the bleeding stump of a single cystic artery. (Three cases).

The immediate mortality in the fifty-one cases was only three. Two patients died from pneumonia and one from cholemia. The late mortality was small One patient died from cholangeitis, seven months after the primary operation. There were forty-two complete recoveries following operative measures.

The ideal procedure of repair, and one only applicable to recent cases, is circular suture of the divided ends. End-to-end anastomosis with the aid of a rubber tube allowed to emerge through a separate opening in the duct or through the ampulla of Vater; that is, into the duodenum, ranks second in the choice of methods.

Reconstruction of the hepatic or common ducts over a rubber tube is preferable in cases in which there is a gap between the ends. The transduodenal drainage method of Voelcker has been employed in too few cases to judge as to its merits.

The author recommends the following precaution during operations on the gall-bladder and the bile ducts. (1) Placing the incision so that adequate exposure of the structures from the liver to the duodenum is obtained. (2) Identification of the supraduodenal portion of the common duct. (3) Separation of the ampulla of the gall-bladder from the common duct. (4) Exposure of the cystic duct and artery, main, hepatic, and common ducts.

FRED R. SANDERSON.

THE CALLOUSED ULCER OF THE POSTERIOR WALL OF THE STOMACH: W. J. Mayo (Ann. of Surg., July, 1920). From July 1, 1914, to July 1, 1919, 647 operations were performed in the clinic on 638 patients with gastric ulcers with an average mortality of 3.2 per cent. During this same five-year period 2,734 operations were performed on 2,720 patients with duodenal ulcers, with an operative mortality of 1.2 per cent. In twenty-eight of the 638 cases of gastric ulcer, the ulcers were multiple. Five hundred thirty-four gastric ulcers were located on or around the lesser curvature, eighty-five involved the posterior wall, nine were on or around the greater curvature, five were on the anterior wall, and five were not located definitely.

Of the eighty-five patients with ulcer on the posterior wall fifty-seven were males, and twenty-eight females; the average age was forty-three and nine-tenths years, the oldest was sixty-nine and the youngest eighteen. The average duration of symptoms was six years and six months; the average weight loss was 17.8 pounds. Anemia was present in all cases and marked in fourteen; the maximum hemoglobin was 66 and the minimum 26 Eight and two-tenths per cent of the ulcers on the posterior wall were in the pyloric third, 16.5 per cent in the cardiac third, and 75.3 per cent in the middle third. All the ulcers were of the chronic perforating varieties. The ulcer encroached on the pancreas in fifty-three cases and in a few of these on the liver, transverse colon, or a mat of adhesions. The pain was in the epigastrium in 56 per cent of the cases, in the back in 24 per cent, radiating to the right in 15 per cent, to the left in 8 per cent, and downward in 8 per cent. Food gave relief in fifty cases. There was slight to moderate obstruction in 35 per cent. Nineteen patients had gross hemorrhages, twenty-one vomited blood, and fifteen—whether or not they vomited blood—had blood in the stools. The clinical diagnosis was correct in seventy-one cases. The x-ray diagnosis was also correct in seventy-one.

The author states that it is difficult to determine the frequency with which chronic ulcer undergoes malignant degeneration, for clinical diagnosis is notoriously defective, postmortem evidence cannot prove the original disease, and operations which do not permit the actual excision of the lesion or removal of a specimen for microscopic examination cannot be relied upon. Aschoff points out that if the lesion is cancer originally the base of the ulcer will prove to be cancer, while Wilson and McCarthy showed that in cases of cancer on ulcer the cancer existed in the overhanging margins of the ulcer and not in the base.

Balfour showed that in cases of duodenal ulcer treated by gastro-enterostomy in which there had been hemorrhage before operation one in eight had hemorrhage afterward, while in cases of gastric ulcer hemorrhage occurred in only one in twelve. Balfour explains this by the frequent excision of gastric ulcer

because of the liability to cancer and the infrequent excision of duodenal ulcers. The death rate from duodenal ulcer in the first two years after operation is practically the normal death rate, and for the second two years it is less than normal, while for gastric ulcer the average death rate in the four years after operation is three times normal; a minority of the patients probably die from cancer of the stomach.

Methods of operative treatment are evaluated as follows: A. Cautery or knife excision is useful in cases of small ulcers. B. Gastro-enterostomy alone is at times warranted by the local or general condition of the patients. C. Resection by the methods of Billroth or the Polya-Balfour is suitable for pyloric ulcers, while the resection in continuity has been an excellent method for ulcers in the middle third. D. Excision and gastro-enterostomy is the logical procedure in the average case, but is sometimes followed by adhesions that immobilize the posterior wall of the stomach. After the posterior wall of the stomach is exposed through the gastrohepatic omentum the ulcer is detached from the pancreas and a specimen removed for microscopic examination. The ulcer is then excised with the cautery and the gap in the stomach closed; the suture line is covered with omentum. A posterior gastro-enterostomy completes the operation.

V. C. HUNT.

GYNECOLOGY AND OBSTETRICS

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THE NUTRITION OF THE FETUS: J. M. Siemons, (Yale Univ. Press). In this interesting monograph, the author considers pregnancy as a problem in nutrition in which metabolic forces favor growth and during which time there is a consistent increase in the mother's weight in excess of that represented by the growing fetus. He quotes experiments which prove that there is an actual storage of foodstuffs by the mother on an ordinary diet and concludes that the period of pregnancy is not one of sacrifice of the maternal organism for the development of the fetus. He notes that the necessary foodstuffs for fetal growth, nitrogenous material, carbohydrates, fat, oxygen, water, and inorganic salts, are to be found in the maternal blood. In studying the relation of the placenta he states that the embryonic demands are slight till after the 18th week, by which time the placenta is so simplified that the maternal circulation is separated from the fetal by only a thin layer of endothelial cells. There are two theories of placental interchange: 1. The "Vitalistic" which assumes activity of placental enzymes in the transmission of material. 2. The "Mechanistic" which assumes that the placenta plays a passive role as a semi-permeable membrane and that substances pass according to the laws of diffusion. He assumes as proven: that these laws apply to the passage of oxygen, carbondi-oxide, and gaseous anasthetics; that insoluble substances and blood cells, do not pass through a normal placenta; and that most soluble substances pass freely in either direction. Siemons' conclusions are based on a comparison of the content of maternal and fetal blood as regard to the essential substances at birth. Non-proteid nitrogen estimated by Folin's method is present in essentially equal amounts in both circulations which indicates that substances included in this class pass freely by diffusion. Amino acids which are crystalline are known to be diffusible and there is no evidence to indicate special function of the placenta in the passage of these substances. Urea, uric acid, and creatinin representing waste products have been shown present in equal amounts, that they pass through the placenta by diffusion. Carbohydrates as determined by the sugar content indicates a slightly higher per cent in the maternal circulation. This does not confirm the theory of a special enzyme activity in the placenta, but rather passage by diffusion with a reserve in the maternal circulation insuring a steady supply of carbohydrates. These are most essential since they are assumed to supply the fetal fats and lipoids. These latter, fats and lipoids show a marked difference with an excess in favor of the mother's circulation and he assumes that these substances do not pass through the placenta at all. Experiments are quoted which show that in the fetus, new fats are formed from carbohydrates derived from the placental circulation.

It is assumed that what has been demonstrated at full term is true at least from the 18th week when the placental structure is simplified and during the period of rapid fetal growth. During this time the placenta acts as a passive semipermeable membrane according to the mechanistic hypothesis. Amino acids and carbohydrates pass freely and the amounts reaching the fetus are regulated by the rate of consumption in its body. All fetal waste products pass through the placenta by diffusion and active elimination on the part of the mother is necessary to maintain adequate purification of the fetal blood. Unfavorable conditions of the mother, nephritis, and organic heart disease result in a concentration of these substances in both the maternal and fetal circulations with an unfavorable effect on the fetus.

The author concludes that the nutrition of the fetus involves two factors: 1. The activity of its own organs which has as yet not been studied and probably can not be exactly compared to postnatal function on account of the prominence of certain special organs during fetal life; thymus gland, etc. 2. The food supply from the maternal circulation as studied in this article offers certain practical conclusions. There is no special diet for pregnancy but

the mother should follow her previous habit and appetite. A diet which has previously been adequate will be sufficient during pregnancy. There is no justification for special diets to limit the growth of the fetus, for when actually carried out they will weaken the mother before the fetus is influenced. So long as the mother's health is maintained, no thought should be given to the size of the fetus, except to determine disproportion to the pelvis in selecting proper methods of delivery.

ARCHIBALD L. MCDONALD.

VENOUS THROMBOSIS, PULMONARY INFARCTION AND EMBOLISM FOLLOWING GYNECOLOGICAL OPERATION: H. H. Hampton & L. R. Wharton, (Bul., Johns Hopkins Hosp., Vol. 31, P. 96). From an exhaustive clinical study of the records of the Johns Hopkins clinic, the authors, develop some interesting and suggestive data. 1. They find 205 cases of femoral thrombophlebitis complicating 21,000 abdominal and perineal operations. This is about 1 per cent which agrees with the experience of other clinics. No type of operation is free from this complication, but 34 per cent of their cases followed hysteromomectomy. It is estimated that from 3 to 5 per cent of such patients will have this complication. 2. In practically all of their cases there was a persistent post-operative fever to 99 or 100. An unexplained elevation of temperature should always arouse suspicion of an unrecognized thrombosis, and conversely an absolutely normal post-operative temperature may be taken to exclude this complication. 3. Femoral thrombophlebitis appears during the second or third post-operative week. It is usually accompanied by: pain, swelling, cyanosis, and fever, though local symptoms may be lacking—with extensive femoral thrombosis. 4. Pulmonary complications occured as follows: Infarction in 7 per cent and pulmonary embolism in 3 cases or about 1 per cent. The authors distinguish pulmonary infarction as the pathological and clinical condition following the dislodgement of an embolus not large enough to occlude the blood supply to an entire lobe, but sufficient to cause hemorrhagic infarction of a part of a lobe. Clearly cut clinical symptoms and signs result. Pulmonary embolism refers to the occlusion of a main branch of the pulmonary artery, involving at least an entire lobe, causing death before there is time for infarction to take place.

5. They studied 34 cases of infarction with 5 deaths, and present a complete clinical picture, emphasizing the following: (a) infarction is found most often in the lower right lobe including a cone-shaped area, with a fibrinous pleural exudate. Necrosis or abscess is rare except with infected emboli or pre-existing local disease. Absorption requires two or three weeks. (b) It is seen most often in patients under 40, (only one being over 50 who are considered good surgical risks. It occurs during the second or third week being preceded by low grade fever. symptoms are: Axillary pain, dyspnoea, dry cough, fever to 102 or 103, followed in 24 to 48 hours by physical signs; friction rub, occasional rales, and less often, dulness on percussion. (c) Important relations: 41 per cent had femoral thrombophlebitis either preceding or following the pulmonary infarction. Ten per cent had repeated attacks of infarction after an interval of a week or 10 days. Three cases developed extensive pulmonary embolism with one fatality. (d) Death was due to gangrene or abscess from spetic emboli or bland emboli lodged in an infected lung, to repeated infarction, or embolism. (e) Diagnosis: Only 10 per cent of their cases were recognized as such being diagnosed as pleurisy, pneumonia or bronchitis, apparently the condition has not attracted much attention in other clinics. This the authors feel is due to failing to consider the entire clinical picture. The attack is preceded by a low grade fever and is frequently associated with evident thrombophlebitis. The symptoms and signs suggest a dry pleurisy rather than pneumonia or bronchitis. 6. Post-operative pulmonary embolism. The authors have studied 21 cases of which 19 were fatal. Of 205 instances of thrombophlebitis in 21,000 operative cases, there were only 3 of pulmonary embolism with but one fatality. Hence it is fair to assume that there is but slight danger of fatal pulmonary embolism complicating femoral thrombophlebitis.

Extensive embolism may complicate any type of gynecological operation, it occurs earlier than the usual thrombophlebitis or pulmonary infarction, and is preceded by low grade fever indicating deep seated pelvic vein thrombosis which condition was demonstrated in 85 per cent of the author's cases. They explain that pelvic vein thrombosis is more closedly associated with or due to trauma, contains less fibrin, and that fragments are more easily dislodged into the circulation than is the case with femoral thrombosis.

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PEDIATRICS

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HEMORRHAGIC TENDENCY AS A FREQUENT CAUSE OF CRANIAL HEMORRHAGE OF THE NEW-BORN: John A. Foote, (Am. Jour. of Dis. of Child., July, 1920). An important factor in intracranial hemorrhage occurring during, or soon after birth, is the so-called hemorrhagic tendency of the new-born, frequently expressed in hemorrhages from the mucous membrane from various portions of the body. These cases may have convulsions, vomiting of blood, and hemorrhages from the rectum; we usually get a fatal result, unless proper remedies

are used at once. The free use of lumbar puncture and of human blood serum, horse serum or thromboplastin is recommended in every instance not only where there are external signs but also where intracranial hemorrhage is suspected. The author is frequently convinced that all of the cases are not maternal but that many cases occur after rapid delivery in which the cause lies not with the mother but with the child. Many of the cases which do not show rupture in the meningeal artery are not frank hemorrhages so much as an oozing of the vessels of the pia, not producing the classical symptoms so early as hemorrhage from the meningeal artery. There is no doubt that great relief can be obtained by lowering intracranial pressure through lumbar puncture. It is also of great value from the diagnostic standpoint.

In infants which showed within twelve to twenty-four hours after birth respiratory distress and blueness, with or without muscular rigidity and twitching, lumbar puncture was performed. In these cases where lumbar puncture was done the fluid showed blood varying from a deep to a light claret color and occasionally small clots.

In the treatment of these cases ten c. c. of serum was injected at a time underneath the skin. The results were very satisfactory. In a series of seven cases only one case died.

The surgical treatment of this condition is one which yields brilliant results when pressure symptoms allow a focal diagnosis. However, early recognition of the condition and treatment directed towards increasing the blood coagulability will be beneficial in a large number of cases where hemorrhage comes from very small vassels even as a preliminary towards surgical decompression when that is found necessary.

ROY N. ANDREWS.

ALLERGY IN INFANTS AND CHILDREN: Oscar M. Schloss, (Am. Jour. of Dis. of Child., 1920, Vol. 19, P. 433-454.) In this paper, based on a thorough study of a large number of sick children, Schloss points out amongst other things that in a sensitive individual cutaneous tests may be negative because of temporary desensitization. He dicusses the production and duration of this desensitization and states that one must not rely on one negative skin reaction to a suspected protein.

In some children gastro-intestinal disturbances can be proven to be due to certain proteins and yet the child may always give negative cutaneous reactions to the incriminated proteins.

This paper is a very valuable one and justice to it cannot be done in a short review.

ROOD TAYLOR.

INTUSSUSCEPTION: Alfred A. Strauss, (Surg. Clin. of Chicago, June, 1920). The suddenness of the onset is quite characteristic of this condition. The pain is paroxysmal at first. Its location varies with the seat of the intussusception. Symptoms may appear while the patient is at rest, in motion, during feeding, or when asleep. The pain is usually followed shortly by vomiting. These two symptoms, pain and vomiting, may be considered to be a constant occurrence in young children. At this time the child usually has one or two bowel movements, they are diarrheal in character, later, though not invariably, bloody mucous or even pure blood may be passed. At this time or even earlier there is a marked prostration which may be followed with collapse. The pulse becomes small and rapid. Vomiting later on becomes fecal in character. A rise of temperature in the early stages is rarely observed, and some cases may show advanced degrees of meteorism.

The tumor of an intususception is a most important physical sign from a diagnostic standpoint. It can usually be felt per rectum, providing it is located in the cecal or in the sigmoid region. By far the largest number of intussusceptions are in the upper right quadrant, and therefore it would be physically impossible to feel a mass by rectal examination. The fluroscopic examination is quite important where it can be obtained and the condition of the child watched. This is accomplished by giving the child a bismuth enema and have an immediate fluroscopic examination made. This gives you a definite diagnosis and also the exact location of the obstruction which is of great advantage in the operative treatment.

A small rubber catheter No. 9 is usually used instead of the regular rectal tube. The enema can is held up just high enough to allow the bismuth to flow slowly along the colon up to the point of obstruction. When we notice a point of obstruction we make gentle pressure upon the abdomen at this point to see if we can force the bismuth further along the colon. By doing this we get a typical concave shadow if obstruction is present. If no intussusception is present, the bismuth will flow along the colon and will also pass through the ileocecal valve in the normal way.

This not only gives you a means of diagnosing intussusception in the colon but also in the lowest portion of the ileum. The most important factors in causing intussusception are: First: The unusually large caliber of the colon and cecum in comparison to the small ileum. Second: The ileocecal valve with the loose and free swinging cecum and ileum allows the ileum to swing in a straight line with the cecum and ascending colon producing a prolapse of the ileum into the cecum. Third: The abnormal tonic contraction of the ileum and cecum during this developmental period.

ROY N. ANDREWS.

ROENTGENOLOGY

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CERVICAL RIBS: James A. Honeij. (Surg. Gyn. and Ob., May, 1920.) Honeij states that a review of the literature of cervical ribs present much contradictory evidence. The symptoms usually associated with the condition are the following (Keen's classification): (1) Local symptoms; tumor, pain on pressure, bruit, etc.; (2) nervous symptoms; (3) vascular symptoms: pulsation, ischaemia, gangrene, oedema, thrombosis, aneurysm; (4) muscular symptoms: wasting, loss of power, easily tired, etc., dysphagia, scoliosis.

Among a group of nine cases presented by the author showing true cervical ribs on x-ray evidence a positive diagnosis was made from symptoms in but one, though five more gave some reference to the cervical region.

Among twelve cases of rudimentary cervical ribs the diagnosis was suspected in two. Among 19 cases suspected of having cervical ribs from the symptoms the x-ray evidence was negative in all. The aetiology of the condition from an embryological and developmental standpoint is discussed, and an extensive bibliography is given. A. U. DESJARDINS.

COMPRESSION FRACTURES OF THE LOWER END OF THE RADIUS: James H. Stevens, (Annals of Surgery, May, 1920). This article is a discussion of the mechanics and treatment of those fractures of the lower end of the radius which have been called Colles for so many years, and which Stevens contends should be called compression fractures of the lower end of the radius.

He presents a long discussion of the experimental and theoretical application of engineering principles to this fracture of the radius to show that the bone breaks in compression and not in tension, primarily, and that if this be so, we get an entirely different kind of break as regards the fibre structure, a compression break on the posterior side of the bone, first above the wrist joint, always at or near the same point, and a tension continuation across to the anterior surface. It does not fissure behind, it may or may not fissure in front. There is actual disintegration and loss of substance of the bone.

Stevens maintains that there is no impaction in any Colles fracture, since by impaction we mean telescoping, and that would mean rigidity in all cases showing this type of deformity. Instead there is actual disintegration and loss of substance. The bony substance has been crushed, disintegrated more or less, and there is nothing to impact. Take the x-rays of bad cases after reduction and you will see that what the x-ray men and the surgeons call impaction still remains, but you will know, since the fragments move easily, there can certainly be no impaction.

Stevens classifies fractures of the lower end of the radius into three groups. First, simple transverse fracture of the bone with little or no evidence of compression. Second, fracture of the lower end of the radius with evidence of great compressive force. Third, Fractures of the lower end of the radius with displacement of the distal fragment backward and sometimes in abduction. The break of the ulnar styloid is simply a sheering fracture. The ulnar fracture higher up is simply a transverse tension break secondary to the main break in the radius.

In reduction of the fracture Stevens lays greatest stress on the restoration of the normal, lateral and antero-posterior angles or planes of the articular surface.

SUMMARY:—First, fractures of the lower end of the radius are always compression fractures, the compressive side breaking first, literally collapsing. The first point of fracture is the point of greatest compression upon the cortical surface of the bone because the stress increases both in compress and tension the further away from the neutral axis. Second: It breaks in compression because the compression is much greater than the tension. Green bone reacts to strain like wet timber. It breaks at the lower end of the radius because there are several forces, and the resultant is on the lower end of the radius posteriorly. This is due to direct compression from above, the hammer blow from below, the resistance both to compression and to blow being not in the center of gravity, but eccentric to it, and, therefore increasing the strain. It is also due in part to the velocity of stress and the molecular inertia of material. Three: These compressive fractures of the lower end of the radius show the evidence of compression. There is actual loss of substance, but no impaction. Breaking up the impaction (so-called) cannot restore the planes of the articulation, nor does it do so.

It might be possible by traction over a long period of time to separate this crushed surface and permit its being filled in by new bone, thus restoring the planes of articulation, but to do this would be to sacrifice some of our chances of securing a freely movable wrist joint. Four: Early reduction followed by early passive and active motion will return all or nearly all compressive fractures of the radius to useful light occupation within twenty days. Any retentive apparatus other than the wrist strap after ten to twelve days contraindicated except in very rare instances. R. G. ALLISON.

CHEST EXAMINATION IN CASES REFERRED FOR GASTRO-INTESTINAL X-RAY EXAMINATION: T. A. Groover & A. C. Christie, (Am. Jour. Roent., Nov., 1919). Report on chest examinations

which were done routinely in 1300 cases referred for X-ray examination of the gastro-intestinal tract. In 807 of the cases both stereo-plates and flouroscope were used while a flouroscopic examination alone was done in 304 and no chest examination was made in 189. Lung lesions were found in 98 cases and of these 84 were tuberculosis. The tuberculous cases, therefore, total 6½ per cent of the total number examined or more than 7½ per cent of the cases in which the chest was examined. In only 6 cases was a lesion found in both the chest and stomach. In practically all the cases the gastro-intestinal symptoms predominated and were merely the local expression of a tuberculous toxemia. Most of the tuberculous cases were of a chronic, slowly progressive type with extensive fibrosis. A few early tuberculous lesions were discovered but these were rare. It is interesting to note that pulmonary tuberculosis occurred with the same frequency as duodenal ulcer in this series of cases.

R. G. ALLISON.

PATHOLOGICAL FINDINGS IN ONE THOUSAND ROENTGEN RAY EXAMINATIONS OF THE DIGESTIVE TRACT: W. Warner Watkins, (Amer. Jour. Roent., May, 1920). This report of 1,000 roentgen ray examinations has a three-fold object: To tabulate the findings in patients coming to the general pratitioner with chronic symptoms referred to the digestive tract; to illustrate the importance of thorough gastrointestinal x-ray examinations, no matter how definite the symptoms may appear; to demonstrate the frequency of certain lesions and of combined lesions of the digestive tract.

All the cases came with definite symptoms in the digestive tract or with evidence that gastrointestinal diseases were present. Four hundred came without a history or any information as to the character of the symptoms; 270 with symptoms pointing to stomach or duodenal lesions; 155 with symptoms suggesting gall bladder disease; 140 with symptoms suggesting appendix disease; and 35 with symptoms suggesting lesions of the colon.

Tables are presented analyzing in detail the x-ray findings in these cases and comparing the x-ray and clinical diagnosis. The x-ray examination was negative in 240 of 1,000 patients. These were attributed to one of three reasons: (A) A failure on the part of the clinician to have a complete examination; (B) Reflex symptoms in the digestic tract caused by lesions elsewhere; (C) Failure to demonstrate the lesion present.

Three hundred and twenty-three cases showed pathological appendices. This series gave 183 patients with chronic gall bladder disease. Duodenal ulcer was found in 124 patients. Stomach ulcer was demonstrated in 93 cases. Cancer of the stomach was found in 36 patients. Adhesions of the colon were found in 50 cases. Tuberculous colitis was found in 24 patients. Stomach syphilis was diagnosed 5 times, 2 of these being congenital in infants. Two additional cases diagnosed as cancer proved to be syphilis. Pyloric stenosis was found twice and three infants showed spasm without stenosis. Diverticuli of the colon was diagnosed 9 times and duodenal diverticuli 4 times. Ninty-five patients showed 2 distinct lesions and nine had triple lesions.

A table is also presented showing in parallel columns the x-ray and operative findings in 146 cases. Of the 146 cases there was disagreement in the findings in 35 cases, of which 12 cases were clearly errors of the roentgenologist in his conclusions.

R. G. ALLISON.

RENAL CALCULUS WITH NEGATIVE X-RAY FINDINGS: A. Hyman, (Boston Med. and Surg. Jour., July 15, 1920). Presents five cases of renal stone with negative x-ray findings which were observed on the surgical service of Mt. Sinai Hospital during several months.

Case 1. A patient admitted with urinary retention, due to an impacted stone in the urethra; urinary extravasation caused by attempts at removing same. X-ray of kidneys and ureter negative for stone. Patient uraemic, exitus. Findings:—Atrophied right kidney with large branching calculus (latent kidney stone), multiple left renal calculi. Chief ingredient of stones, urates.

Case 2. A patient with anuria, spontaneously relieved. Second attack of anuria; operation; death. Numerous calculi found in both kidneys, also along coudse of right ureter, although ureteral catheter was passed into pelvis on this side without encountering any obstruction. Stones from both kidneys uratic. Right kidney enlarged and pyelonephritic. Negative x-ray findings on right side, positive shadow on left side.

Case 3. A patient with uraemic manifestations; negative x-rays. Bilateral diseased kidneys with calculi. Latent stones on the left side.

Case 4. Patient with left lumbar pain radiating to thigh, accompanied by urinary frequency. X-ray of urinary tract negative. Presence of stone confirmed by wax tipped bougie. Five days later patient passed a smooth yellowish stone the size of a large cherry pit. Analysis of the calculus showed it was composed chiefly of ammonium urates.

Case 5. A patient with dull pain in right lumbar region, non-radiating. Frequency of urination; chills and fever at onset. X-ray examination of urinary tract on two occasions negative. Presence of stone confirmed by wax tipped bougie. Operation and recovery.

He sites the figures of Cabot that renal calculi fail to show roentgenographically in from 6 per cent to 15 per cent of the cases; in ureteral stone from 15 per cent to 30 per cent; and in vesical stone more than 60 per cent of the calculi fail to cast shadows. In accounting for the failure to demonstrate stones on x-ray examination several factors must be con-

sidered. The chemical composition of the stone is one important factor, the stones composed of urates being less likely to give a shadow than those composed of phosphate and oxalates. The obesity of the patient is another factor. He considers that local conditions in the kidney which cover the calculus with inflamed kidney, pus, or fibrin, as well as condensed fat may cause the inability to demonstrate the stone.

R. G. ALLISON.

ROENTGENOTHERAPY OF FIBROIDS:—Beclare, (Arch. Rad. & Electroth., Vol. 24, P. 254). Beclare quotes the results obtained in 400 cases of uterine fibroids which underwent Roentgenotherapy. The average age was 45 years. In 85 per cent of the cases the tumors were of sufficient size to be easily palpated through the abdominal wall. The treatments were given at weekly intervals, two areas being treated at each sitting. In very large tumors, the abdomen was divided in several areas which in turn served as portals of entry for the rays. He uses a cone of lead glass which is opaque to the ray. Under this he interposed a thin disk of wood which served to reduce the distance between the uterus and the target of the tube.

In over half the cases a clinical cure was obtained in 13 treatments given at weekly intervals. In only 4 of the cases was it necessary to resort to surgery. The menopause was usually definitely etablished after a few treatments although in 12 per cent of the cases the supression of the periods was only temporary and they returned after several months or years. Further treatment in these cases invariably restored the menopause. In every case treated, not only was the growth of the tumor arrested but its size was actually diminished.

R. G. ALLISON.

BOOK REVIEWS

BOOKS RECEIVED FOR REVIEW

Medical Clinics of North America, May, 1920, W. B. Saunders Co., Philadelphia.

Surgical Clinics of Chicago, June, 1920, W. B. Saunders Co., Philadelphia.

General Introduction to Psychoanalysis, Freud, Boni & Liveright, New York, 1920.

Care and Feeding of Infants, Ramsey, J. B. Lippincott Co., Philadelphia, $2.50, 1920.

Medicine and Nursing, Oxford University Press, 1919.

Standard First Aid Manual, Johnson & Johnson, N. J.

Epidemic Encephalitis, Tilney & Howe, Paul B. Hoeber, New York, $3.50, 1920.

NERVOUS AND MENTAL DISEASES. By Archibald Church, M. D., Professor of Nervous and Mental Diseases in Northwestern University Medical School, Chicago; and Frederick Peterson, M. D., formerly Professor of Psychiatry, Columbia Univerity. Ninth edition. W. B. Saunders Company, 1919. $7.00 net.

The 9th edition of Nervous and Mental Diseases, Church and Peterson, has made its appearance. Any book, scientific or otherwise, which reaches a 9th edition, it goes without saying must have something of unusual merit in it to recommend it.

The same plan which has made the former editions of this book so successful, has been strictly adhered to in this 9th edition. As the authors themselves say, the book is written simply and solely as a text book, for the use of students and also to fulfill the needs of busy general practitioners, who from time to time desire a reliable reference in the subjects of Neurology and Psychiatry.

The entire literature of these subjects has been carefully sifted by the authors and an up-to-date digest from this sifting has been made, which, in the light of their own experience and teaching, seemed the best method of presenting them in the briefest and clearest manner.

The book is not a collaboration of both authors. The subject of Neurology is presented by Dr. Church, while that of Psychiatry is dealt with by Dr. Peterson.

That these authors have succeeded in attaining their object in presenting a text book adequately fulfilling the requirements of both students and general practitioners, the success of former editions as well as the appearance of the 9th edition is convincing proof.

C. R. BALL.

A DIABETIC MANUAL. By Elliott P. Joslin, M. D. Assistant Professor of Medicine, Harvard Medical School, etc. Second Edition, Lea & Febiger, Philadelphia and New York, 1919. $1.75.

The author states that lack of exercise, obesity, infections and heredity are important factors to be considered in the causation of diabetes. He shows in recent years the decrease of mortality from this disease and attributes it principally to the introduction of newer methods of treatment inaugurated by Allen, to the more accurate tests for the estimation of the severity of acid poisoning, to the preliminary omission of fats, to the omission of alkalies, and lastly to the reporting of diabetic patients at intervals for examination and further instructions. Then follow questions and answers for diabetic patients as well as indispensable tests, weight of food and food determination. The diabetic arithmetic consists of the metric system with a table of foods arranged approximately according to the content of carbohydrate, another showing the quantity of carbohydrate, protein, fat, and the caloric value of one ounce of foods in common use and then follows a rapid computation of a diet table. In order that the patient may get the highest efficiency out of his visit to the

doctor, a careful physical examination, urinalysis, blood chemistry and body weight is recorded. The patient being instructed to keep a note book, brings this also at his visit to the physician to enable him to draw more accurate deductions and give specific details in the treatment. Physical and mental hygiene for diabetics is strongly advised and some very interesting remarks and letters from patients are quoted. After a discussion of the diet of normal individuals in various occupations the composition of normal diet is approximately given as carbohydrate 400, fat 100, and protein 100 grams.

For small amounts of food, household measures are held to be impracticable. In commenting on the diet of diabetics, the author states that if one-fourth of the normal carbohydrate can be given, the results are gratifying. About 1.5 grams of protein per kilogram of body weight is given and the bulk of the caloric value for maintaining weight, the fats must contribute. The use of alcohol is questionable, liquids and sodium chloride is encouraged, and danger of fats to diabetics is forcibly emphasized. In the dietetic treatment of diabetics, urine should be sugar freed first by eliminating fats, then proteins from the diet and finally halving the carbohydrates until about 30 grams are given when fasting may be safely undertaken. If the patient still has sugar in the urine after 3 to 4 days, fasting, 1 gram protein or .5 gram carbohydrate per kilogram are given for a day or two and fasting again resumed. This procedure with careful observation of patient, can be repeated until urine is sugar free. After this has been accomplished, carbohydrates are given 5 to 10 grams daily until sugar appears. The patient is starved again sugar free and then brought only up to about two-thirds of his original carbohydrate tolerance when proteins are added to the diet from 15 to 20 grams daily until 1 to 1.5 grams per kilogram are being given. Then fats are freely added from 15 to 20 grams daily to the above diet according to the previous acidosis until patient is losing no weight. Diets with illustrated cases are placed here to facilitate the dietetic management of typical cases.

Acid intoxication and coma should be combated by good nursing, rest in bed, care of bowels, administration of about 1000 cc. liquids every 6 hours, and stimulants such as digitalis, coffee, caffein; alkalies should be avoided, and if patient is used to fasting, this should be instituted, otherwise fats should be omitted.

A further discussion follows, giving reasons for loss of weight during the first two weeks and the waste of food eliminated as sugar in the urine. Care of teeth, skin and daily baths avoiding extremes in temperature, are very useful. Constipation and diarrhea should be avoided and a certain amount of daily exercise is advised. The final chapters deal with dietetic suggestions, recipes, menus, diet tables and selected laboratory tests useful in the modern diabetic treatment, such as pertain to the examination of urine, blood and expired air.

It is unnecessary to state that for its kind it is one of the most useful diabetic books written in any language, both to the patient and physician, as firm co-operation and mutual understanding are indispensable for the successful treatment of this condition.

J. A. LEPAK.

THE DISEASES OF INFANTS AND CHILDREN. By J. P. Crozer Griffith, M. D., Phd. W. B. Saunders & Co. $16.00.

This two volume work is profusely and beautifully illustrated. It has been the author's aim to present a review of the subject of medical pediatrics. Some subjects in surgery, and some of the special branches with which pediatricians must be familiar, are included.

Of special value are the foot notes, referring to the literature from which quotations have been made, making further research possible, and as the author says, "The foot-note method interferes in no way with its usefulness to those others who are interested in this line of research".

Numerous cross references throughout the work call attention to the discussions of the subjects on other pages, which might otherwise be overlooked. In the chapter on intestinal diseases, the author pays tribute to Finkelstein's classification, but at the same time points out its disadvantages, and gives a classification based chiefly upon clinical manifestations, modified by what we know of the respective action of the food ingredients and of the bacteria.

This work will hold its own in the growing field of pediatric literature.

G. K. HAGAMAN.